IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	
Christian Almberg et al.	Group Art Unit: 3761
Application No.: 10/684,585	Examiner: Jacqeline F Stephens
Filed: October 15, 2003	Appeal No.: ______________
For: BELTED ABSORBENT ARTICLE	

RESUBMISSION OF APPEAL BRIEF

Mail Stop APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Notification of Non-Compliant Appeal Brief dated May 22, 2009, Applicants hereby resubmit the attached Appeal Brief pursuant to 37 C.F.R. § 41.37(d). An original Appeal Brief was filed October 14, 2008. A Supplemental Appeal Brief was filed November 24, 2008. The attached Appeal Brief is a complete document comprising all the elements listed in 37 C.F.R. § 41.37(c)(1).

This appeal is from the decision of the Primary Examiner dated August 12, 2008 finally rejecting claims 1-8 and 12-21, which are reproduced as the Claims Appendix of this brief.

The $540 government fee was submitted with the Appeal Brief filed October 14, 2008. The Commissioner is hereby authorized to charge any appropriate fees under 37 C.F.R. §§1.16, 1.17, and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 02-4800.

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I. Real Party in Interest

The present application is assigned to SCA Hygiene Products AB. SCA Hygiene Products AB is the real party in interest, and is the assignee of Application No. 10/684,585.

II. Related Appeals and Interferences

The Appellants' legal representative, or assignee, does not know of any other appeal or interferences which will affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

However, as set forth in greater detail below, the final decision in Appeal No. 2000000921 in U.S. Patent Application No. 08/366,090 which resulted in U.S. Patent No. 6,994,698 addressed issues quite similar to those presented in this appeal, and should therefore be of interest to the panel.

III. Status of Claims

Claims 1-6 and 12-27 have been finally rejected as being unpatentable over U.S. H1674 (*Ames*).

Claims 7 and 8 have been finally rejected over *Ames* in view of US 2003/0100878 (*Leak*).

On September 18, 2008, SPE Zalukaeva sent, via facsimile, three pages of additional comments citing to additional sections of the applied references. The three pages are attached in the Evidence Appendix. Claims 9 - 11 have been indicated as containing allowable subject matter, but have been objected to.

IV. Status of Amendments

No amendments have been filed after the final rejection.

V. Summary of Claimed Subject Matter

Pursuant to 37 C.F.R. § 41.37(c)(1)(v) a concise explanation of the subject matter defined in each of the independent claims involved in the appeal is provided below which refers to the specification by page and line number, and to the drawings by reference characters. Further, every means plus function and step plus function as permitted by 35 U.S.C. 112, sixth paragraph, is identified and exemplary structure, material, or acts described in the specification as corresponding to each claimed function is set forth with reference to the specification by page and line number, and to the drawing, if any, by reference characters. The references shall not be construed as limiting the claimed invention to the preferred disclosed embodiments.

Claim 1 With Inserted Reference Numerals	**Page and Line Where Exemplary Description May Be Found In Specification**
A belted absorbent article (10) comprising:	p. 3, l. 25; p. 7, ll. 2-10
an absorbent structure (16) extending about a first longitudinal axis (18), said absorbent structure (16) including a topsheet (20), a backsheet (22) and an absorbent batt (24) disposed between said topsheet (20) and said backsheet (22),	p. 3, ll. 26-28; p. 7, l. 11 – p.8, l. 10
said absorbent structure (16) having a transverse axis (T) dividing the absorbent structure (16) into a front panel (26) terminating in a front end region (28) and a rear panel (30) terminating in a rear end region (32), said absorbent structure (16) being delimited by opposed longitudinal edges (34) and opposed transverse edges (36), and	p. 3, l. 28 – p. 4, l. 3; p. 8, ll. 11-23

a pair of opposed belt halves (12, 14) comprising nonwoven material attached to said absorbent structure (16) at said rear end region (32) of said rear panel (30), each of said belt halves (12, 14) being attached by a respective joint (50), each belt half (12, 14) extending about a longitudinal axis (40, 42) of the belt such that each belt half (12, 14) extends outwardly from a respective longitudinal edge (34) of the absorbent structure (16),	p. 4, ll. 3-6; p. 8, l. 24 – p. 10, l. 18; p. 11, l. 3 – p. 12, l-19
wherein each of said joints (50) between each said belt half (12, 14) and said absorbent structure (16) is such that when each said belt half (12, 14) is subjected to a tension force of 35 N acting along said longitudinal axis (42) of the belt, and said longitudinal axis (40, 42) of the belt creates an angle (α) to said transverse axis of said absorbent structure (16), the following minimum average release times (t) of each said belt half (12, 14) from said absorbent structure (16) are attained:	p. 4, ll. 6-11 p. 12, l. 20– p. 13, l. 3 p. 15, l. 8 – p. 16, l.6
when $\alpha = 10°$, $t \geq 720$ seconds; when $\alpha = 20°$, $t \geq 330$ seconds; when $\alpha = 25°$, $t \geq 240$ seconds; when $\alpha = 30°$, $t \geq 180$ seconds; and when $\alpha = 40°$, $t \geq 75$ seconds.	p. 4, ll. 11-15; p. 13, ll. 4-10

Claim 6 With Inserted Reference Numerals	**Page and Line Where Exemplary Description May Be Found In Specification**
The article as claimed in claim 1,	See above with respect to claim 1.

wherein each said belt half (12, 14) is attached to said absorbent structure (16) at said rear end region (32) between said topsheet (20) and said backsheet (22)	p. 11, ll. 5-10

Claim 7 With Inserted Reference Numerals	**Page and Line Where Exemplary Description May Be Found In Specification**
The article as claimed in claim 6,	See above with respect to claim 6.
wherein each of said joints (50) between each said belt half (12, 14) and said rear end region (32) comprises two spaced substantially parallel lines of attachment (54) between each said belt half (12, 14) and said backsheet (22).	p. 11, ll. 17-21

Claim 12 With Inserted Reference Numerals	**Page and Line Where Exemplary Description May Be Found In Specification**
The article as claimed in claim 1,	See above with respect to claim 1.
wherein each of said belt halves (12, 14) comprises a film/nonwoven laminate.	p. 9, ll. 4-8

Claim 19 With Inserted Reference Numerals	**Page and Line Where Exemplary Description May Be Found In Specification**
A belted absorbent article (10) comprising:	p. 3, l. 25; p. 7, ll. 2-10
an absorbent structure (16) extending about a first longitudinal axis(18), said absorbent structure (16) including a topsheet (20), a backsheet (22) and an absorbent batt (24) disposed between said topsheet (20) and said backsheet (22),	p. 3, ll. 26-28; p. 7, l. 11 – p.8, l. 10
said absorbent structure (16) having a transverse axis (T) dividing the absorbent structure (16) into a front panel (26) terminating in a front end region (28) and a rear panel (30) terminating in a rear end region (32), said absorbent structure (16) being delimited by opposed longitudinal edges (34) and opposed transverse edges (36), and	p. 3, l. 28 – p. 4, l. 3; p. 8, ll. 11-23

a pair of opposed belt halves (12, 14) comprising exclusively nonwoven material attached to said absorbent structure (16) at said rear end region (32) of said rear panel (30) and at least one fastening tab (38), each of said belt halves (12, 14) being attached by a respective joint (50), each belt half (12, 14) extending about a longitudinal axis (40, 42) of the belt such that each belt half (12, 14) extends outwardly from a respective longitudinal edge (34) of the absorbent structure (16),	p. 4, ll. 3-6; p. 8, l. 24 – p. 10, l. 18;
wherein each of said joints (50) between each said belt half (12, 14) and said absorbent structure (16) is such that when each said belt half (12, 14) is subjected to a tension force of 35 N acting along said longitudinal axis (42) of the belt and said longitudinal axis (42) of the belt creates an angle (α) to said transverse axis of said absorbent structure (16), the following minimum average release times (t) of each said belt half (12, 14) from said absorbent structure (16) are attained:	p. 4, ll. 6-11 p. 11, l. 3 – p. 13, l. 3 p. 15, l. 8 – p. 16, l.6
when $\alpha = 10°$, $t \geq 720$ seconds; when $\alpha = 20°$, $t \geq 330$ seconds; when $\alpha = 25°$, $t \geq 240$ seconds; when $\alpha = 30°$, $t \geq 180$ seconds; and when $\alpha = 40°$, $t \geq 75$ seconds.	p. 4, ll. 11-15; p. 13, ll. 4-10

Claim 20 With Inserted Reference Numerals	Page and Line Where Exemplary Description May Be Found In Specification
A belted absorbent article (10) comprising:	p. 3, l. 25; p. 7, ll. 2-10
an absorbent structure (16) extending about a first longitudinal axis (18), said absorbent structure (16) including a topsheet (20), a backsheet (22) and an absorbent batt (24) disposed between said topsheet (20) and said backsheet (22),	p. 3, ll. 26-28; p. 7, l. 11 – p.8, l. 10
said absorbent structure (16) having a transverse axis (T) dividing the absorbent structure (16) into a front panel (26) terminating in a front end region (28) and a rear panel (30) terminating in a rear end region (32), said absorbent structure (16) being delimited by opposed longitudinal edges (34) and opposed transverse edges (36), and	p. 3, l. 28 – p. 4, l. 3; p. 8, ll. 11-23

a pair of opposed belt halves (12, 14) comprising exclusively nonwoven material attached to said absorbent structure (16) at said rear end region (32) of said rear panel (30) and at least one fastening tab(38), each of said belt halves (12, 14) being attached by a respective joint (50, and paragraphs [0067] through [0098]), each belt half (12, 14) extending about a longitudinal axis (40, 42) of the belt such that each belt half (12, 14) extends outwardly from a respective longitudinal edge (34) of the absorbent structure (16),	p. 4, ll. 3-6; p. 8, l. 24 – p. 10, l. 18
wherein each of said joints (50) between each said belt half (12, 14) and said absorbent structure (16) comprises means for joining whereby when each said belt half (12, 14) is subjected to a tension force of 35 N acting along said longitudinal axis (42) of the belt and said longitudinal axis (42) of the belt creates an angle (α) to said transverse axis of said absorbent structure (16), the following minimum average release times (t) of each said belt half (12, 14) from said absorbent structure (16) are attained (paragraphs [0067] through [0098]):	p. 4, ll. 6-11 p. 11, l. 3 – p. 13, l. 3 p. 15, l. 8 – p. 16, l.6
when $\alpha = 10°$, $t \geq 800$ seconds; when $\alpha = 20°$, $t \geq 370$ seconds; when $\alpha = 25°$, $t \geq 260$ seconds; when $\alpha = 30°$, $t \geq 220$ seconds; and when $\alpha = 40°$, $t \geq 100$ seconds.	p. 4, ll. 11-15; p. 13, ll. 4-10

Claim 20 recites "means for joining" as permitted by 35 U.S.C. 112, sixth paragraph. Exemplary structure, material, or acts described in the specification as corresponding to the claimed function may be found at p. 7, l. 5 – p. 12, l. 19 and Fig 3.

Claim 21 With Inserted Reference Numerals	**Page and Line Where Exemplary Description May Be Found In Specification**
A belted absorbent article (10) comprising:	p. 3, l. 25; p. 7, ll. 2-10
an absorbent structure (16) extending about a first longitudinal axis(18), said absorbent structure (16) including a topsheet (20), a backsheet (22) and an absorbent batt (24) disposed between said topsheet (20) and said backsheet (22),	p. 3, ll. 26-28; p. 7, l. 11 – p.8, l. 10
said absorbent structure (16) having a transverse axis (T) dividing the absorbent structure (16) into a front panel (26) terminating in a front end region (28) and a rear panel (30) terminating in a rear end region (32), said absorbent structure (16) being delimited by opposed longitudinal edges (34) and opposed transverse edges (36), and	p. 3, l. 28 – p. 4, l. 3; p. 8, ll. 11-23

a pair of opposed belt halves (12, 14) comprising nonwoven material attached to said absorbent structure (16) at said rear end region (32) of said rear panel (30), each of said belt halves (12, 14) being attached by a respective joint (50), each belt half (12, 14) extending about a longitudinal axis (40, 42) of the belt such that each belt half (12, 14) extends outwardly from a respective longitudinal edge (34) of the absorbent structure (16),	p. 4, ll. 3-6; p. 8, l. 24 – p. 10, l. 18
wherein each of said joints (50) between each said belt half (12, 14) and said absorbent structure (16) comprises means for joining such that when each said belt half (12, 14) is subjected to a tension force of 35 N acting along said longitudinal axis (42) of the belt, said longitudinal axis (42) of the belt creates an angle (α) to said transverse axis of said absorbent structure (16), and the following minimum average release times (t) of each said belt half (12, 14) from said absorbent structure (16) are attained:	p. 4, ll. 6-11 p. 11, l. 3 – p. 13, l. 3 p. 15, l. 8 – p. 16, l.6
when $\alpha = 10°$, $t \geq 720$ seconds; when $\alpha = 20°$, $t \geq 330$ seconds; when $\alpha = 25°$, $t \geq 240$ seconds; when $\alpha = 30°$, $t \geq 180$ seconds; and when $\alpha = 40°$, $t \geq 75$ seconds.	p. 4, ll. 11-15; p. 13, ll. 4-10

Claim 21 recites "means for joining" as permitted by 35 U.S.C. 112, sixth paragraph. Exemplary structure, material, or acts described in the specification as corresponding to the claimed function may be found at p. 7, l. 5 – p. 12, l. 19 and Fig 3.

Claim 22 With Inserted Reference Numerals	**Page and Line Where Exemplary Description May Be Found In Specification**
A belted absorbent article (10) comprising:	p. 3, l. 25; p. 7, ll. 2-10
an absorbent structure (16) extending about a first longitudinal axis (18), said absorbent structure (16) including a topsheet (20), a backsheet (22) and an absorbent batt (24) disposed between said topsheet (20) and said backsheet (22),	p. 3, ll. 26-28; p. 7, l. 11 – p.8, l. 10
said absorbent structure (16) having a transverse axis (T) dividing the absorbent structure (16) into a front panel (26) terminating in a front end region (28) and a rear panel (30) terminating in a rear end region (32), said absorbent structure (16) being delimited by opposed longitudinal edges (34) and opposed transverse edges (36), and	p. 3, l. 28 – p. 4, l. 3; p. 8, ll. 11-23
a pair of opposed belt halves (12, 14) comprising nonwoven material attached to said absorbent structure (16) at said rear end region (32) of said rear panel (30), each of said belt halves (12, 14) being attached by a respective joint (50), each belt half (12, 14) extending about a longitudinal axis (40, 42) of the belt such that each belt half (12, 14) extends outwardly from a respective longitudinal edge (34) of the absorbent structure (16),	p. 4, ll. 3-6; p. 8, l. 24 – p. 10, l. 18

wherein each of said belt halves (12, 14) is attached to the absorbent structure (16) between said topsheet (20) and said backsheet (22) with the respective joints (50) each comprising at least one region of bonding between each said belt half (12, 14) and said topsheet (20), and each of said joints (50) is spaced from the longitudinal edge (34) associated with the respective belt half (12, 14);	p. 4, ll. 3-6; p. 8, l. 24 – p. 10, l. 18; p. 11, l. 3 – p. 12, l-19
wherein each of said joints (50) between each said belt half (12, 14) and said absorbent structure (16) is such that when each said belt half (12, 14) is subjected to a tension force of 35 N acting along said longitudinal axis (42) of the belt, and said longitudinal axis (42) of the belt creates an angle (α) to said transverse axis of said absorbent structure (16), the following minimum average release times (t) of each said belt half (12, 14) from said absorbent structure (16) are attained:	p. 4, ll. 6-11 p. 12, l. 21 – p. 13, l. 3 p. 15, l. 8 – p. 16, l.6
when $\alpha = 10°$, $t \geq 720$ seconds; when $\alpha = 20°$, $t \geq 330$ seconds; when $\alpha = 25°$, $t \geq 240$ seconds; when $\alpha = 30°$, $t \geq 180$ seconds; and when $\alpha = 40°$, $t \geq 75$ seconds.	p. 4, ll. 11-15; p. 13, ll. 4-10

Claim 23 With Inserted Reference Numerals	**Page and Line Where Exemplary Description May Be Found In Specification**
The article as claimed in claim 1,	See above with respect to claim 1.
wherein each of said belt halves (12, 14) is attached to the absorbent structure (16) between said topsheet (20) and said backsheet (22), and each of said joints (50) includes a region of attachment between the respective belt half (12, 14) and said backsheet (22) and a region of attachment between the respective belt half (12, 14) and said topsheet (20).	p. 11, ll. 8-10 p. 12, ll. 3-19

Claim 24 With Inserted Reference Numerals	**Page and Line Where Exemplary Description May Be Found In Specification**
The article as claimed in claim 23,	See above with respect to claim 23.
wherein the region of attachment between the respective belt half (12, 14) and said backsheet (22) includes first and second spaced substantially parallel lines of attachment (54) between each respective belt half (12, 14) and said backsheet (22).	p. 11, l. 17 –p. 12, l.5

Claim 27 With Inserted Reference Numerals	**Page and Line Where Exemplary Description May Be Found In Specification**
A belted absorbent article (10) comprising:	p. 3, l. 25; p. 7, ll. 2-10
an absorbent structure (16) extending about a first longitudinal axis (18), said absorbent structure (16) including a topsheet (20), a backsheet (22) and an absorbent batt (24) disposed between said topsheet (20) and said backsheet (22),	p. 3, ll. 26-28; p. 7, l. 11 – p.8, l. 10
said absorbent structure (16) having a transverse axis (T) dividing the absorbent structure (16) into a front panel (26) terminating in a front end region (28) and a rear panel (30) terminating in a rear end region (32), said absorbent structure (16) being delimited by opposed longitudinal edges (34) and opposed transverse edges (36), and	p. 3, l. 28 – p. 4, l. 3; p. 8, ll. 11-23
a pair of opposed belt halves (12, 14) comprising nonwoven material attached to said absorbent structure (16) at said rear end region (32) of said rear panel (30), each of said belt halves (12, 14) being attached by a respective joint (50), each belt half (12, 14) extending about a longitudinal axis (40, 42) of the belt such that each belt half (12, 14) extends outwardly from a respective longitudinal edge (34) of the absorbent structure (16),	p. 4, ll. 3-6; p. 8, l. 24 – p. 10, l. 18; p. 11, l. 3 – p. 12, l-19

wherein the respective joints (50) each comprising means for counteracting the shear force which arises between each said belt half (12, 14) and the absorbent structure (16) when each belt half (12, 14) is subjected to a tension force at an angle α to the transverse axis such that when each said belt half (12, 14) is subjected to a tension force of 35 N acting along said longitudinal axis (42) of the belt, and said longitudinal axis (42) of the belt creates an angle (α) to said transverse axis of said absorbent structure (16), the following minimum average release times (t) of each said belt half (12, 14) from said absorbent structure (16) are attained:	p. 4, ll. 6-11 p. 12, l. 20– p. 13, l. 3 p. 15, l. 8 – p. 16, l.6
when α = 10°, t ≥720 seconds; when α = 20°, t ≥330 seconds; when α = 25°, t ≥240 seconds; when α = 30°, t ≥180 seconds; and when α = 40°, t ≥75 seconds.	p. 4, ll. 11-15; p. 13, ll. 4-10

Claim 27 recites "means for counteracting the shear force which arises between each said belt half and the absorbent structure when each belt half is subjected to a tension force at an angle α to the transverse axis" as permitted by 35 U.S.C. 112, sixth paragraph. Exemplary structure, material, or acts described in the specification as corresponding to the claimed function may be found at p. 7, l. 5 – p. 12, l. 19 and Fig 3.

VI. Grounds of Rejection to be Reviewed on Appeal

(1) Whether claims 1 - 6 and 12 - 27 are unpatentable under 35 U.S.C. § 102(e), (f), or (g) over U.S. H1674 (*Ames*).

(2) Whether claims 1 - 6 and 12 - 27 are unpatentable under 35 U.S.C. § 103(a) over *Ames*.

(3) Whether claims 7 – 8 are unpatentable under 35 U.S.C. § 103(a) over *Ames* in view of US 2003/0100878 (*Leak*).

VII. Argument

(1) Whether Claims 1 - 6 and 12 - 27 Are Unpatentable Under 35 U.S.C. § 102(e), (f), or (g) Over U.S. H1674 (Ames).

(a) Claim 1

The Examiner alleges that Ames discloses a belted absorbent article comprising a topsheet 24, a backsheet 26 joined to the topsheet, an absorbent core 28 between the topsheet and the backsheet, and a pair of opposed belt halves 62,64. The Examiner alleges that the belt halves of Ames "have elastic capabilities and can be subjected to a tension and provide a release time from that tension." However, the Examiner acknowledges that Ames does not teach the claimed release times. To overcome this deficiency, the Examiner makes the following argument:

> The release times are directed to an intended use of the article. Intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. See *In re Casey* 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963) If the prior art structure is capable of performing the intended use, then it meets the claim limitations.

OFFICIAL ACTION DATED JANUARY 24, 2008, at 6.

The Examiner Ignores Structure in the Claims:

The Examiner takes the position that the claims do not include any structure that distinguishes the claims over the prior art. The Examiner takes the position that the claim recitation concerning the strength, i.e., release times, of the joints does not define any structure. However, the Examiner's own analysis reflects the error in the conclusion. Specifically, while referring to factors that affect release times, the Examiner identifies, among other things, the materials used and the strength of the joint.[1] The Examiner alleges that "All of these factors presumable [sic] affect release times and all can be manipulated *without changing the structure of the article*". (emphasis added) See the bottom half of page 2 of the Official Action dated January 24, 2008.

It is hard to imagine how one could "manipulate" the materials used and/or the strength of the joint without "changing the structure of the article". Such manipulations inherently change the structure of the article. Thus, Applicants submit that the Examiner has effectively conceded that the claim limitations define structure of the article.

The Board's attention is directed to § 2111.04 of the M.P.E.P., wherein it states that when a whereby clause states a condition that is material to patentability, it cannot be ignored in order to change the substance of the invention. And, as explained in the M.P.E.P.:

> A functional limitation must be evaluated and considered, just like any other limitation of the claim, for what it fairly conveys to a person of ordinary skill in the pertinent art in the context in which it is used. A functional limitation is often used in association with an element, ingredient, or step of a process to define a particular capability or purpose that is served by the recited element, ingredient or step.... In a claim that was directed to a kit of component parts capable of being assembled, the Court held that limitations such as "members adapted to be positioned" and "portions . . . being resiliently dilatable whereby said housing may be slidably positioned" serve to precisely define present structural attributes of interrelated component parts of the claimed assembly. *In re Venezia*, 530 F.2d 956, 189 U.S.P.Q. 149 (CCPA 1976).

M.P.E.P. § 2173.05(g)

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[1] The Examiner also refers to the "angle of the belt". As is clear from the specification, such language does not refer to the angle at which the belt is attached to the article, it refers to an angle that is created by a force applied to the belt. For example, the belt may be perpendicular to the transverse axis of the article (see paragraphs [0036] and [0040] of the as-filed application.) However, the angle referred to in the claims is the angle of the force applied to the belt. See paragraph [0042] of the application. However, the present invention is not limited to the preferred disclosed embodiments.

***In re Venezia*:**

The subject claim limitations are similar in concept to the structural limitations in *In re Venezia*. A copy of *Venezia* claim 31 is attached in the Evidence Appendix. The Examiner alleges that the present case is different from *Venezia*, alleging the cited case (*Venezia*) has substantial structural features. However, the claim at issue in *Venezia* included many phrases that are substantially similar to the phrases in the present case that the Examiner alleges to be an intended use, including, e.g., "adapted to be fitted", "capable of being assembled", "adapted to be affixed", and "may be slideably positioned".

Taking into account the italicized portions of the claim, the Court held that such language was structural, and not an intended use.

> The claimed invention does include present structural limitations on each part, which structural limitations are defined by how the parts are to be interconnected in the final assembly, *if assembled*...Rather than being a mere direction of activities to take place in the future, this language imparts a structural limitation to the sleeve.

In re Venezia, 530 F.2d 956, 189 U.S.P.Q. 149, 151-52 (CCPA 1976).

The claims in the present application similarly recite structural limitations in the form of conditions that must be fulfilled by the claimed joints. For example, only joints that meet certain structural criteria will satisfy the release times. Accordingly, the test set forth in claim 1 is not dependent upon how the claimed article will be used, it is dependent on whether the claimed article has certain structural features, i.e., sufficient strength to meet the claim requirements. Applicants submit that the joints are limited by the requirements of the releasing clause since only certain joints will meet such requirements.

In re Leak:

Applicants also submit in the Evidence Appendix a prior Board decision, *In re Leak,* which overturned a rejection of claims having the same issue as the present claims. *See In re Leak,* Appeal No. 2000000921 (U.S. Patent No. 6,994,698), Paper 25 mailed April 24, 2002. The claims in *Leak* derived their patentability in large part upon a measured result, rather than from any specific recitation of the structure of the article that was used to meet the measured result. Applicants submit that the present application should be considered and examined with the same standards that were applied to its competitor's application which resulted in the *Leak* patent. Competitors need an even playing field. The Examiner has failed to address the issue, merely stating that she will not comment on the patentability of another application. However, Applicants are not requesting the Examiner's comments on the patentability of *Leak*, the Applicants merely want the Examiner to consider the fact that the type of claim limitations that the Examiner is ignoring in the present case were considered in full by the Board of Appeals in the *Leak* case.

In re Casey:

In *In re Casey*, cited by the Examiner, the claim at issue recited a function to be performed by the claimed machine. The Examiner in *In re Casey* refused to give patentable weight to the claimed functions. *See In re Casey*, 370 F.2d 576, 152 U.S.P.Q. 235 (C.C.P.A. 1967) However, on appeal the Court held that the Board of Appeals ***properly considered the functional language***, and found that the machine disclosed in the applied reference was also capable of performing the recited functions. *Id.* at 237 – 38. ("The board considered that the structure provided by the reference possessed the capabilities requisite to meet the terms of the claims.") Thus, in *In re Casey,* the functional recitations *were considered.*

The Facts Do Not Support An Inherency Rejection:

As a second position, the Examiner maintains that "when the structure recited in the reference is substantially identical to that of the claims of the instant invention, claimed properties or functions are presumed to be inherent (M.P.E.P. §§ 2112-2112.02)." However, according to M.P.E.P. § 2112, IV, "In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." This is the principle discussed above with regard to *Leak et al.*

Ames does not disclose any specific structure for joining the belt flaps to the rear of the absorbent article. The entire disclosure related thereto, as set forth at col. 17, lines 51-53, is that if the belt flaps 62 and 64 are separate elements joined to the diaper 20, they can be joined "*by any means as known in the art*." In order to rely on the theory of inherency, it must be shown that the recited conditions ***must*** be met in each and every instance. MPEP, section 2112, IV. Clearly, it must be recognized that ***all*** "means as known in the art" will not ***necessarily*** satisfy the requirements of the means for joining recited in claim 1. Accordingly, the claimed joint cannot be inherent based on *Ames.*

Unexpected Results:

On page 4 of the Official Action dated January 24, 2008, the Examiner dismisses the Applicants' declaration concerning unexpected results.

In the Declaration Under Rule 1.132 of Mr. Christian Almberg, in paragraphs 3 and 6, Mr. Almberg explains that he and his colleague were able to establish that there ***surprisingly and unexpectedly*** existed a relationship for a given force between the angle at which the force was applied and the time it took for the belt half to become detached from the product. Thus, on the basis of these findings, by ensuring that the joints of a belted absorbent article display the claimed minimum average release times at the various values of the angle α, the claimed absorbent article will be sufficiently reliable in use.

The Examiner refuses to consider the Applicants' unexpected results, alleging that the Applicants must submit specific comparative results between the present invention and the prior art. However, the Examiner has not correctly understood the unexpected results. Applicants submit that the unexpected result is the *relationship between the angle at which a force is applied and the time it took for the belt half to become detached.* Such data are clearly shown in detail in paragraphs [0056] and [0057] of the as-filed patent application.

Accordingly, the evidence of unexpected results must be considered.

In view of the foregoing, Applicants request that the rejection of claim 1 be reversed.

(b) Claims 6, 12, 19, 20 – 24, and 27

The foregoing arguments with respect to claim 1 apply to each of the pending claims. In addition to the language set forth above with respect to claim 1, claims 6, 12, 19, 20 – 24, and 27 contain additional language that was ignored by the Examiner. In the "paper" sent by the SPE on September 18, 2008, some of these elements were briefly addressed.

Even without considering the claimed release times, claims 6, 12, 19, 20 – 24, and 27 contain significant structural features that have been literally ignored by the Examiner, in spite of many requests to consider such features.

(i) **claim 6:** "attached...between said topsheet and said backsheet"

Claim 6 recites that each said belt half (12, 14) is attached to said absorbent structure (16) at said rear end region (32) between said topsheet (20) and said backsheet (22). In the "paper" sent by the SPE on September 18, 2008, it is alleged that the belt flaps can comprise the waist feature 34, and that the "waist feature is between the topsheet and backsheet". However, there is no support in *Ames* for such a conclusion. *Ames* does not state that the waist feature is between the topsheet and backsheet. Accordingly, claim 6 provides further structural details of the invention that have not been properly addressed by the Examiner.

Applicants submit that the features of claim 6 that have not been addressed by the Examiner, in combination with the rest of the claim, provide structure that renders the claimed product advantageous over the applied prior art, and that the rejection thereof should be reversed.

(ii) **claim 19:** belt halves are exclusively nonwoven

The Examiner has failed to address the fact that claim 19 requires that the belt halves are exclusively nonwoven. Applicants submit that the features of claim 19 that have not been addressed by the Examiner, in combination with the rest of the claim, provide structure that renders the claimed product advantageous over the applied prior art, and that the rejection thereof should be reversed.

(iii) **claim 20**: "*means* for joining..."

Claim 20 recites that each of said joints (50) between each said belt half (12, 14) and said absorbent structure (16) comprises ***means for joining*** such that when each said belt half (12, 14) is subjected to a tension force of 35 N acting along said longitudinal axis (42) of the belt, said longitudinal axis (42) of the belt creates an angle (α) to said transverse axis of said absorbent structure (16), and minimum average release times (t) of each said belt half (12, 14) from said absorbent structure (16) are attained. The Examiner refers to column 17, lines 49 - 57, of Ames as a teaching of "means for joining belt halves". However, such "reference" fails to comply with the USPTO guidelines set forth in MPEP § 2181, which implements *In re Donaldson*. Specifically, the Examiner has ignored the structure in the specification that supports the joining function. The Board's attention is directed to the arguments set forth above with respect to claim 1, concerning the "means for joining" element.

Applicants submit that the features of claim 20 that have not been addressed by the Examiner, in combination with the rest of the claim, provide structure that renders the claimed product advantageous over the applied prior art, and that the rejection thereof should be reversed.

(iv) **claim 21:** "*means* for joining..."

Claim 21 recites that each of said joints (50) between each said belt half (12, 14) and said absorbent structure (16) comprises ***means for joining*** such that when each said belt half (12, 14) is subjected to a tension force of 35 N acting along said longitudinal axis (42) of the belt, said longitudinal axis (42) of the belt creates an angle (α) to said transverse axis of said absorbent structure (16), and minimum average release times (t) of each said belt half (12, 14) from said absorbent structure (16) are attained. The Examiner refers to column 17, lines 49 - 57, of Ames as a teaching of "means for joining belt halves". However, such "reference" fails to comply with the USPTO guidelines set forth in MPEP § 2181, which implements *In re Donaldson*. Specifically, the Examiner has ignored the structure in the specification that supports the joining function. The Board's attention is directed to the arguments set forth above with respect to claim 1, concerning the "means for joining" element.

Applicants submit that the features of claim 21 that have not been addressed by the Examiner, in combination with the rest of the claim, provide structure that renders the claimed product advantageous over the applied prior art, and that the rejection thereof should be reversed.

(v) **claim 22:** "one region of bonding between each said belt half and said topsheet, and each of said joints is spaced from the longitudinal edge..."

Claim 22 recites that each of said belt halves (12, 14) is attached to the absorbent structure (16) between said topsheet (20) and said backsheet (22) with the respective joints (50) ... and each of said joints (50) is spaced from the longitudinal edge (34) associated with the respective belt half.

The Examiner has stated "Even if the joints are at the longitudinal edge, they are still spaced somewhat from the longitudinal edge. One other interpretation is any point of the joint is spaced from the longitudinal edge as it is broadly claimed." See the "paper" faxed from the SPE. However, to the extent that this statement can be understood, it does not provide a "reasonable" interpretation of the claim language.

Applicants submit that the features of claim 22 that have not been addressed by the Examiner, in combination with the rest of the claim, provide structure that renders the claimed product advantageous over the applied prior art, and that the rejection thereof should be reversed.

(vi) **claim 23:** locations of regions of attachment

Claim 23 depends from claim 1 and states that each of said belt halves (12, 14) is attached to the absorbent structure (16) between said topsheet (20) and said backsheet (22), and each of said joints (50) includes a region of attachment between the respective belt half (12, 14) and said backsheet (22) and a region of attachment between the respective belt half (12, 14) and said topsheet (20). In other words, there is a region of attachment on each side of the belt half where the belt half is between the topsheet and the backsheet. In spite of the Examiner's additional comments in the "paper" faxed on September 18, 2008, this feature still has not been addressed.

Applicants submit that the features of claim 23 that have not been addressed by the Examiner, in combination with the rest of the claim, provide structure that renders the claimed product advantageous over the applied prior art, and that the rejection thereof should be reversed.

(vii) **claim 24:** "first and second spaced substantially parallel lines of attachment..."

Claim 24 recites that the region of attachment between the respective belt half (12, 14) and said backsheet (22) includes first and second spaced substantially parallel lines of attachment (54) between each respective belt half (12, 14) and said backsheet.

To meet this requirement, the Examiner refers to Figure 3 of Leak. However, Figure 3 of Leak has nothing to do with the attachment of a belt half to the backsheet in between the backsheet and the topsheet. Figure 3 of Leak discloses rows of fasteners for fastening a tab to an outside sheet of the article. Although Figure 9 of Leak discloses parallel rows 56 of adhesive, they are not used to attach a belt half between the backsheet and the topsheet. The rows 56 in Leak are used to secure a tab to an outside surface of the article.

Applicants submit that the features of claim 24 that have not been addressed by the Examiner, in combination with the rest of the claim, provide structure that renders the claimed product advantageous over the applied prior art, and that the rejection thereof should be reversed.

(viii) **claim 27:** "*means* for counteracting the shear force...".

Claim 27 recites that the respective joints (50) each comprise "means for counteracting the shear force which arises between each said belt half (12, 14) and the absorbent structure (16) when each belt half (12, 14) is subjected to a tension force at an angle α to the transverse axis...". Although not addressed in the final rejection, in the "paper" faxed on September 18, 2008, the Examiner stated that the means are not defined in the specification. However, § 2181 clearly states that support for a means plus function element may be implicit or inherent in the specification. It is only required that one skilled in the art will be able to determine what structure performs the recited function.

Applicants submit that one skilled in the art would have no trouble identifying the structure that counteracts the shear force. Accordingly, the Examiner has failed to examine this claim in accordance with the requirements of MPEP § 2181 and *In re Donaldson*.

Applicants submit that the features of claim 27 that have not been addressed by the Examiner, in combination with the rest of the claim, provide structure that renders the claimed product advantageous over the applied prior art, and that the rejection thereof should be reversed.

(c) Claims 2-5, 13-18, 19, and 25–26

The foregoing arguments with respect to claim 1 apply to each of the pending claims. Accordingly, claims 2-5, 13-18, 19, and 25–26 are allowable for similar reasons.

Applicants respectfully request that the rejections of claims 1 - 6 and 12 - 27 under 35 U.S.C. § 102 be reversed.

(2) Whether Claims 1 - 6 and 12 - 27 Are Unpatentable Under 35 U.S.C. § 103(a) Over *Ames*.

The arguments set forth in the preceding sections concerning the rejections under 35 USC 102 are incorporated herein by reference. In addition, contrary to the allegations of the Examiner, the present invention would not have been obvious to one having ordinary skill in the art. Specifically, the present invention is not simply a question of how strong or securely the belt halves are attached to the absorbent article. If that were the case, the joint between the belt halves and the absorbent article could simply be increased to a minimum level. Rather, the tendency for the belt halves to fail at increasing values of the angle α was not in the toolbox of knowledge of one skilled in the art. It is only with the benefit of this insight arrived at by the present inventors that one skilled in the art would even start to look for a solution to this problem. However, it is improper to use the unique findings of the inventors as a motivation for one skilled in the art to seek a solution to a problem that had not previously been identified.

According to the present invention, the joint between each belt half of the article and the absorbent structure should ensure that the article remains in the intended position on the wearer. This function places certain minimum requirements on the strength of the joint. As is explained in paragraph [0007] of the specification, the article must be capable of fulfilling these functions even when worn by wearers of greatly differing size and shape.

The present inventors have recognized that there is a tendency for existing belted absorbent articles to fail prematurely due to the joint between the belt halves and the absorbent structure, releasing either as the article is being put on or during use. With hindsight, one solution to such a problem might seem to be to make the joint between the belt halves and the absorbent structure stronger by, for example, using more adhesive or increasing the size of the bonding area. However, to keep production costs as low as possible and to keep the comfort of the product as high as possible, it is desirable to use as little bonding material as possible. To excessively increase the bonding area and/or the amount of adhesive in each product would lead to an unacceptable increase in the cost of such an article or decrease in the comfort of the article. Since adhesive generally restricts the breathability of an absorbent article, as well as tending to increase the stiffness of the regions of the article to which it is applied, it is desirable from a wearer comfort point of view to minimize the quantity of adhesive in an absorbent article.

The present inventors were therefore faced with providing a joint between belt halves in the absorbent structure of a belted absorbent article which they could be sure would be strong enough to be adequately reliable during use, but which would not incur undue expense during manufacture, nor unduly comprise wearer comfort. As explained in paragraph [0008] of the application, the inventors recognized that the failure of the joint between the belt halves and the absorbent structure was more prevalent at greater values of the angle α, i.e., the angle between the longitudinal axis of the belt half and the transverse axis of the absorbent structure. They discovered that, in order for a belted absorbent article to function satisfactorily, while still keeping manufacturing costs as low as reasonably possible, the joint between each belt half and the absorbent structure should preferably meet certain minimum requirements depending upon the angle α. The inventors discovered that if an article displays the minimum characteristics set forth in the claims, it will be adequately reliable in use. In other words, according to the present invention, a manufacturer can immediately ascertain whether his product will fulfill market expectations regarding reliability, and at the same time avoid "over engineering" the products.

It is the inventors' realization that the strength of the joint can be dependent upon the value of the angle α, and that as a result, over engineering of the products can be avoided. It is the recognition of this relationship and its application to the present invention that is not taught or suggested by the prior art.

This situation is analogous to the numerous cases which hold that recognition of a problem must be considered in determining the obviousness of the solution. See, e.g., *In re Zurko*, 42 U.S.P.Q. 1476 (Fed. Cir. 1997) and *In re Hamilton*, 17 U.S.P.Q. 245 (C.C.P.A. 1933). Accordingly, the Examiner has failed to consider the fact that the applicants discovered the relationship between the angle α and the strength of the joint. *In view of the fact that no one in the prior art recognized this relationship, it cannot be said that the solution set forth in the claims is obvious.*

As a result of the inventors work, the claims define an article that is strong enough to function properly, and that can avoid being over-engineered.

In view of the foregoing remarks, the Board is respectfully requested to reverse the outstanding rejections of claims 1 – 6 and 12 - 27.

(3) Whether Claims 7 – 8 Are Unpatentable Under 35 U.S.C. § 103(a) Over *Ames* in View of US 2003/0100878 (*Leak*).

The foregoing arguments also apply to claims 7 and 8. In addition to the language set forth above with respect to claims 1 and 6, claim 7 contains additional language that was ignored by the Examiner.

(i) **claims 7-8:** "two spaced substantially parallel lines of attachment..."

Claim 7 recites that each of said joints (50) between each said belt half (12, 14) and said rear end region (32) comprises two spaced substantially parallel lines of attachment (54) between each said belt half (12, 14) and said backsheet (22). To meet this requirement, the Examiner refers to Figure 3 of Leak. However, Figure 3 of Leak has nothing to do with the attachment of a belt half to the backsheet in between the backsheet and the topsheet. Figure 3 of Leak discloses rows of fasteners for fastening a tab to an outside sheet of the article. Although Figure 9 of Leak discloses parallel rows 56 of adhesive, they are not used to attach a belt half between the backsheet and the topsheet. The rows 56 in Leak are used to secure a tab to an outside surface of the article.

Applicants submit that the features of claim 7 that have not been addressed by the Examiner, in combination with the rest of the claim, provide structure that renders the claimed product advantageous over the applied prior art, and that the rejection thereof should be reversed.

In view of the foregoing remarks, the Board is respectfully requested to reverse the outstanding rejections of claims 7 and 8.

VIII. Claims Appendix

See attached Claims Appendix for a copy of the claims involved in the appeal.

IX. Evidence Appendix

See attached Evidence Appendix for copies of evidence relied upon by Appellant.

X. Related Proceedings Appendix

See attached Related Proceedings Appendix for copies of decisions identified in Section II, supra.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date June 18, 2009

By: /Christopher L. North/
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VIII. CLAIMS APPENDIX

The Appealed Claims

1. A belted absorbent article comprising:

an absorbent structure extending about a first longitudinal axis, said absorbent structure including a topsheet, a backsheet and an absorbent batt disposed between said topsheet and said backsheet, said absorbent structure having a transverse axis dividing the absorbent structure into a front panel terminating in a front end region and a rear panel terminating in a rear end region, said absorbent structure being delimited by opposed longitudinal edges and opposed transverse edges, and

a pair of opposed belt halves comprising nonwoven material attached to said absorbent structure at said rear end region of said rear panel, each of said belt halves being attached by a respective joint, each belt half extending about a longitudinal axis of the belt such that each belt half extends outwardly from a respective longitudinal edge of the absorbent structure,

wherein each of said joints between each said belt half and said absorbent structure is such that when each said belt half is subjected to a tension force of 35 N acting along said longitudinal axis of the belt, and said longitudinal axis of the belt creates an angle (α) to said transverse axis of said absorbent structure, the following minimum average release times (t) of each said belt half from said absorbent structure are attained:

when $\alpha = 10°$, $t \geq 720$ seconds;
when $\alpha = 20°$, $t \geq 330$ seconds;
when $\alpha = 25°$, $t \geq 240$ seconds;
when $\alpha = 30°$, $t \geq 180$ seconds; and
when $\alpha = 40°$, $t \geq 75$ seconds.

2. The article as claimed in claim 1, wherein the following minimum average release times (t) of each said belt half from said absorbent structure are attained:

when $\alpha = 10°$, $t \geq 740$ seconds;
when $\alpha = 20°$, $t \geq 340$ seconds;
when $\alpha = 25°$, $t \geq 245$ seconds;
when $\alpha = 30°$, $t \geq 190$ seconds; and
when $\alpha = 40°$, $t \geq 80$ seconds.

3. The article as claimed in claim 1, wherein the following minimum average release times (t) of each said belt half from said absorbent structure are attained:

when $\alpha = 10^\circ$, $t \geq 760$ seconds;
when $\alpha = 20^\circ$, $t \geq 350$ seconds;
when $\alpha = 25^\circ$, $t \geq 250$ seconds;
when $\alpha = 30^\circ$, $t \geq 200$ seconds; and
when $\alpha = 40^\circ$, $t \geq 85$ seconds.

4. The article as claimed in claim 1, wherein the following minimum average release times (t) of each said belt half from said absorbent structure are attained:

when $\alpha = 10^\circ$, $t \geq 780$ seconds;
when $\alpha = 20^\circ$, $t \geq 360$ seconds;
when $\alpha = 25^\circ$, $t \geq 255$ seconds;
when $\alpha = 30^\circ$, $t \geq 210$ seconds; and
when $\alpha = 40^\circ$, $t \geq 90$ seconds.

5. The article as claimed in claim 1, wherein the following minimum average release times (t) of each said belt half from said absorbent structure are attained:

when $\alpha = 10^\circ$, $t \geq 800$ seconds;
when $\alpha = 20^\circ$, $t \geq 370$ seconds;
when $\alpha = 25^\circ$, $t \geq 260$ seconds;
when $\alpha = 30^\circ$, $t \geq 220$ seconds; and
when $\alpha = 40^\circ$, $t \geq 100$ seconds.

6. The article as claimed in claim 1, wherein each said belt half is attached to said absorbent structure at said rear end region between said topsheet and said backsheet.

7. The article as claimed in claim 6, wherein each of said joints between each said belt half and said rear end region comprises two spaced substantially parallel lines of attachment between each said belt half and said backsheet.

8. The article as claimed in claim 7, wherein said two spaced substantially parallel lines of attachment are adhesive bond lines.

12. The article as claimed in claim 1, wherein each of said belt halves comprises a film/nonwoven laminate.

13. The article as claimed in claim 1, wherein each of said belt halves consists of nonwoven material.

14. The article as claimed in claim 1, wherein the topsheet comprises nonwoven material.

15. The article as claimed in claim 1, wherein the backsheet comprises a film/nonwoven laminate.

16. The article as claimed in claim 1, wherein each of said belt halves consists of nonwoven material, wherein the topsheet comprises nonwoven material, and wherein the backsheet comprises a film/nonwoven laminate.

17. The article as claimed in claim 1, wherein each of said belt halves is attached to said absorbent structure with adhesive.

18. The article as claimed in claim 1, wherein each of said belt halves is attached to said absorbent structure with a thermal or ultrasonic bond.

19. A belted absorbent article comprising:

an absorbent structure extending about a first longitudinal axis, said absorbent structure including a topsheet, a backsheet and an absorbent batt disposed between said topsheet and said backsheet, said absorbent structure having a transverse axis dividing the absorbent structure into a front panel terminating in a front end region and a rear panel terminating in a rear end region, said absorbent structure being delimited by opposed longitudinal edges and opposed transverse edges, and

a pair of opposed belt halves comprising exclusively nonwoven material attached to said absorbent structure at said rear end region of said rear panel and at least one fastening tab, each of said belt halves being attached by a respective joint, each belt half extending about a longitudinal axis of the belt such that each belt half extends outwardly from a respective longitudinal edge of the absorbent structure,

wherein each of said joints between each said belt half and said absorbent structure is such that when each said belt half is subjected to a tension force of 35 N acting along said longitudinal axis of the belt and said longitudinal axis of the belt creates an angle (α) to said transverse axis of said absorbent structure, the following minimum average release times (t) of each said belt half from said absorbent structure are attained:

when $\alpha = 10°$, $t \geq 720$ seconds;
when $\alpha = 20°$, $t \geq 330$ seconds;
when $\alpha = 25°$, $t \geq 240$ seconds;
when $\alpha = 30°$, $t \geq 180$ seconds; and
when $\alpha = 40°$, $t \geq 75$ seconds.

20. A belted absorbent article comprising:

an absorbent structure extending about a first longitudinal axis, said absorbent structure including a topsheet, a backsheet and an absorbent batt disposed between said topsheet and said backsheet, said absorbent structure having a transverse axis dividing the absorbent structure into a front panel terminating in a front end region and a rear panel terminating in a rear end region, said absorbent structure being delimited by opposed longitudinal edges and opposed transverse edges, and

a pair of opposed belt halves comprising exclusively nonwoven material attached to said absorbent structure at said rear end region of said rear panel and at least one fastening tab, each of said belt halves being attached by a respective joint, each belt half extending about a longitudinal axis of the belt such that each belt half extends outwardly from a respective longitudinal edge of the absorbent structure,

wherein each of said joints between each said belt half and said absorbent structure comprises means for joining whereby when each said belt half is subjected to a tension force of 35 N acting along said longitudinal axis of the belt and said longitudinal axis of the belt creates an angle (α) to said transverse axis of said absorbent structure, the following minimum average release times (t) of each said belt half from said absorbent structure are attained:

when $\alpha = 10°$, $t \geq 800$ seconds;
when $\alpha = 20°$, $t \geq 370$ seconds;
when $\alpha = 25°$, $t \geq 260$ seconds;
when $\alpha = 30°$, $t \geq 220$ seconds; and
when $\alpha = 40°$, $t \geq 100$ seconds.

21. A belted absorbent article comprising:

an absorbent structure extending about a first longitudinal axis, said absorbent structure including a topsheet, a backsheet and an absorbent batt disposed between said topsheet and said backsheet, said absorbent structure having a transverse axis dividing the absorbent structure into a front panel terminating in a front end region and a rear panel terminating in a rear end region, said absorbent structure being delimited by opposed longitudinal edges and opposed transverse edges, and

a pair of opposed belt halves comprising nonwoven material attached to said absorbent structure at said rear end region of said rear panel, each of said belt halves being attached by a respective joint, each belt half extending about a longitudinal axis of the belt such that each belt half extends outwardly from a respective longitudinal edge of the absorbent structure,

wherein each of said joints between each said belt half and said absorbent structure comprises means for joining such that when each said belt half is subjected to a tension force of 35 N acting along said longitudinal axis of the belt, said longitudinal axis of the belt creates an angle (α) to said transverse axis of said absorbent structure, and the following minimum average release times (t) of each said belt half from said absorbent structure are attained:

when $\alpha = 10°$, $t \geq 720$ seconds;
when $\alpha = 20°$, $t \geq 330$ seconds;
when $\alpha = 25°$, $t \geq 240$ seconds;
when $\alpha = 30°$, $t \geq 180$ seconds; and
when $\alpha = 40°$, $t \geq 75$ seconds.

22. A belted absorbent article comprising:

an absorbent structure extending about a first longitudinal axis, said absorbent structure including a topsheet, a backsheet and an absorbent batt disposed between said topsheet and said backsheet, said absorbent structure having a transverse axis dividing the absorbent structure into a front panel terminating in a front end region and a rear panel terminating in a rear end region, said absorbent structure being delimited by opposed longitudinal edges and opposed transverse edges, and

a pair of opposed belt halves comprising nonwoven material attached to said absorbent structure at said rear end region of said rear panel, each of said belt halves being attached by a respective joint, each belt half extending about a longitudinal axis of the belt such that each belt half extends outwardly from a respective longitudinal edge of the absorbent structure,

wherein each of said belt halves is attached to the absorbent structure between said topsheet and said backsheet with the respective joints each comprising at least one region of bonding between each said belt half and said topsheet, and each of said joints is spaced from the longitudinal edge associated with the respective belt half;

wherein each of said joints between each said belt half and said absorbent structure is such that when each said belt half is subjected to a tension force of 35 N acting along said longitudinal axis of the belt, and said longitudinal axis of the belt creates an angle (α) to said transverse axis of said absorbent structure, the following minimum average release times (t) of each said belt half from said absorbent structure are attained:

when $\alpha = 10^\circ$, $t \geq 720$ seconds;
when $\alpha = 20^\circ$, $t \geq 330$ seconds;
when $\alpha = 25^\circ$, $t \geq 240$ seconds;
when $\alpha = 30^\circ$, $t \geq 180$ seconds; and
when $\alpha = 40^\circ$, $t \geq 75$ seconds.

23. The article as claimed in claim 1, wherein each of said belt halves is attached to the absorbent structure between said topsheet and said backsheet, and each of said joints includes a region of attachment between the respective belt half and said backsheet and a region of attachment between the respective belt half and said topsheet.

24. The article as claimed in claim 23, wherein the region of attachment between the respective belt half and said backsheet includes first and second spaced substantially parallel lines of attachment between each respective belt half and said backsheet.

25. The article as claimed in claim 1, wherein each of said belt halves is attached to the absorbent structure between said topsheet and said backsheet, and each of said joints includes at least one of a region of attachment between the respective belt half and said backsheet and a region of attachment between the respective belt half and said topsheet.

26. The article as claimed in claim 1, wherein each of said belt halves is substantially rectangular.

27. A belted absorbent article comprising:

an absorbent structure extending about a first longitudinal axis, said absorbent structure including a topsheet, a backsheet and an absorbent batt disposed between said topsheet and said backsheet, said absorbent structure having a transverse axis dividing the absorbent structure into a front panel terminating in a front end region and a rear panel terminating in a rear end region, said absorbent structure being delimited by opposed longitudinal edges and opposed transverse edges, and

a pair of opposed belt halves comprising nonwoven material attached to said absorbent structure at said rear end region of said rear panel, each of said belt halves being attached by a respective joint, each belt half extending about a longitudinal axis of the belt such that each belt half extends outwardly from a respective longitudinal edge of the absorbent structure,

wherein the respective joints each comprising means for counteracting the shear force which arises between each said belt half and the absorbent structure when each belt half is subjected to a tension force at an angle α to the transverse axis such that when each said belt half is subjected to a tension force of 35 N acting along said longitudinal axis of the belt, and said longitudinal axis of the belt creates an angle (α) to said transverse axis of said absorbent structure, the following minimum average release times (t) of each said belt half from said absorbent structure are attained:

when $\alpha = 10^\circ$, $t \geq 720$ seconds;
when $\alpha = 20^\circ$, $t \geq 330$ seconds;
when $\alpha = 25^\circ$, $t \geq 240$ seconds;
when $\alpha = 30^\circ$, $t \geq 180$ seconds; and
when $\alpha = 40^\circ$, $t \geq 75$ seconds.

IX. EVIDENCE APPENDIX

1. 3 page facsimile from SPE Tatyana Zalukaeva, dated September 18, 2008.

2. Claim 31 from *In re Venezia*, 530 F.2d 956, 189 U.S.P.Q. 149, 150-151 (CCPA 1976)

3. *In re Leak,* Appeal No. 2000000921 in U.S. Patent Application No. 08/366,090, Final Decision, Paper 25, mailed April 24, 2002.

4. Declaration of Christian Almberg filed with response dated September 11, 2006.

5. U.S. H1674 (*Ames*), cited by the Examiner.

6. U.S. Patent Application Publication No. 2003/0100878 (Leak), cited by the Examiner.

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Re: 10/684,585
cc:

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● **Comments:**

Dear Mr. Rowland,

As you requested I have reviewed the prosecution of this Application and discussed it with another senior examiner. Although, as I mentioned to you before, the PREAPPEAL review DOES NOT respond to Applicant's arguments but solely decides, if the case is ready to go for appeal, however, I am attaching brief statement showing the specific places in the references where the limitations of the claims are disclosed or fairly suggested.

I believe it would be better to respond this way instead of discussing it over the phone. I also think that the best way to resolve the disagreement on the claim interpretation and applicability of the reference(s) is by sending it to the Board.

If I can be of further assistance, please, do not hesitate to contact me. My schedule is extremely busy, however, I will definitely find the time to respond.

Sincerely

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SEP 18 2008
Buchanan Ingersoll & Rooney PC

In the pre-appeal request filed 6/24/08, Applicant suggested several structural features that allegedly have been ignored by the Examiner. The following represents passages in Ames H1674 and Leak 2003/0100878 where the structural features can be found:

- Claim 6, :attached... between said topsheet and said backsheet" - found in Ames col. 17, lines 46-51 where Ames teaches the belt flaps 62, 64 can comprise an extension of the topsheet 24, backsheet 36 or both or the waist feature 34. The waist feature is between the topsheet and backsheet.
- Claim 7:"two spaced substantially parallel lines of attachment..." - found in Leak Figure 3.
- Claim 11:"each of said joint between each said belt half and said rear end region further comprises at least one region of bonding between each said belt half and said topsheet"- indicated in office action as allowable subject matter, why is Applicant arguing this point?
- Claim 12: "a film/nonwoven laminate" - found in Ames col. 17, lines 60-64; col. 18, lines 10-21 and in Buell 5151092, which is incorporated by reference
- Claims 20 and 21: "means for joining" - Ames col. 17, lines 49-57 teaches means for joining belt halves.
- Claim 22:"one region of bonding between each said belt half and said topsheet, and each of said joints is spaced from the longitudinal edge..." - Ames as discussed above teaches bonding of separate belt halves. Even

if the joints are at the longitudinal edge, they are still spaced somewhat from the longitudinal edge. One other interpretation is any point of the joint is spaced from the longitudinal edge as broadly as it is claimed.

- Claim 23:" locations of regions of attachment" - what is actually claimed is the belt halves are attached to the absorbent structure between the topsheet and backsheet (addressed above in claim 6); and each joint has a region of attachment between the backsheet and topsheet. If it is attached between the topsheet and backsheet it necessarily has a region of attachment.
- Claim 24:"first and second spaced substantially parallel lines of attachment this should have been rejected under Ames/Leak as in claim 7 above
- Claim 27:"means for counteracting shear force" - firstly means are not defined anywhere in the specification. We agreed in the panel review that any means can counteract the shear force, simply pulling on the diaper is a means to counteract shear force.

EXHIBIT

The following is a reproduction of Claim 31 at issue in *In re Venezia*, 530 F.2d 956, 189 U.S.P.Q. 149, 150-151 (CCPA 1976) as quoted therein with emphasis provided by the court:

> 31. A splice connector kit having component parts *capable of being assembled* in the field at the terminus of high voltage shielded electrical cables for providing a splice connection between first and second such cables, said cables each having a conductor surrounded by an insulating jacket within a conductive shield wherein a portion of the conductive shield is removed to expose the insulating jacket and a portion of the insulating jacket is removed to expose the conductor at the terminus of the cable, the kit comprising the combination of:
>
> a pair of sleeves of elastomeric material, each sleeve of said pair *adapted to be fitted* over the insulating jacket of one of said cables, each said sleeve having an external surface and a resiliently dilatable internal bore for gripping the insulating jacket to increase the dielectric strength of the creep path along the insulating jacket;
>
> electrical contact means *adapted to be affixed* to the terminus of each exposed conductor for joining the conductors and making an electrical connection therebetween;
>
> a pair of retaining members *adapted to be positioned* respectively between each of said sleeves fitted over the insulating jacket of each said cable and the corresponding terminus of each said cable, said retaining members each having means cooperatively associated therewith for maintaining each said member's position relative to the insulating jacket on each said cable and for precluding axial movement of the sleeve toward the corresponding terminus of each said cable; and
>
> a housing, said housing having an internal bore extending therethrough from end to end, said housing including portions adjacent each end thereof defining said internal bore and being resiliently dilatable *whereby said housing may be slideably positioned* over one of said cables and *then slideably repositioned* over said sleeves, said retaining members, and said contact means *when said sleeves, said retaining members and said contact means are assembled* on said cables as hereinaforesaid, said resiliently dilatable portions of said housing respectively gripping the corresponding external surface of each said sleeve in watertight sealing relationship therewith and said housing having a further portion intermediate its ends defining said internal bore and forming a sealed chamber enclosing at least said contact means and the exposed portions of said cable conductors *when said housing is in its repositioned location.*

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

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PAT. & T.M. OFFICE
BOARD OF PATENT APPEALS
AND INTERFERENCES

Paper No. 25

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte A. TODD LEAK, APIROMRAJ S. ROSLANSKY,
PAUL T. VAN GOMPEL, GEORGIA L. ZEHNER,
EDWARD H. RUSCHER, and YUNG HSIANG HUANG

Appeal No. 2000-0921
Application No. 08/366,090

ON BRIEF

Before COHEN, STAAB, and McQUADE, Administrative Patent Judges.
STAAB, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal from the examiner's final rejection of claims 1-54, all the claims pending in the application.

Appellants' invention pertains to a mechanical fastener tab suitable for use on a disposable absorbent product (claims 1-11), wherein the fastening tab comprises a substrate and a first mechanical fastener component[1] joined to the substrate, with the fastening tab having a Gurley stiffness value[2] of less than about 1000 milligrams in the area of the fastening tab that includes the first mechanical fastener component. Appellants' invention also pertains to a disposable product (claims 12-33 and 54) and to a disposable absorbent product (claims 34-53) comprising a mechanical fastening tab as described above. According to appellants, mechanical fastening tabs in accordance with the invention have improved flexibility. A further understanding of the claimed invention can be derived from a reading of exemplary claim 1, which appears in the appendix to appellants' brief.

The references applied in the final rejection are:

Flug et al. (Flug)	5,401,275	Mar. 28, 1995 (filed Sept. 11, 1991)
Roessler et al. (Roessler)	5,176,670	Jan. 5, 1993

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[1] As stated on page 6 of appellants' specification, "a first mechanical fastener component is intended to refer to a material which is adapted to mechanically interlock with a second material. . . . In the illustrated embodiment, the first mechanical fastener component is the hook portion of a hook-and-loop fastener."

[2] Reference is made to pages 17-18 of appellants' specification for an explanation of a suitable technique for determining Gurley stiffness values.

Claims 1-54 stand rejected under 35 U.S.C. § 103 as being unpatentable over Roessler in view of Flug. The examiner states (final rejection, page 2):

> Roessler teaches all aspect[s] of the claimed invention except for the specific Gurley stiffness values and substrate overlay of 2%-98%.[3] The Roessler article comprises similar materials as recited in applicants' invention, therefore the Gurley stiffness value is considered to be the same. The Gurley stiffness values recited in applicants' specification, even though performed in a standard testing machine, are considered useless for comparison purposes to the prior art. The Gurley stiffness values can vary depending to sample size and other factors. Even if Roessler stated a Gurley stiffness value, there would be no way to correlate a Roessler value with the claimed values due to different testing procedures.

The examiner further considers (final rejection, page 3) that substrate overlayment of from about 2% to about 98%, as called for in claims 8 and 20, is taught by Flug, and that it would have been obvious in view of this teaching to provide a similar overlayment arrangement in Roessler. The examiner contends (final rejection, page 3) that the rejection is proper because "[a]pplicants have not sufficiently demonstrated that the fastening tab of Roessler will not meet the test value of applicants' invention when tested in accordance to applicants' test method."

---

[3] The requirement that the substrate overlays from about 2 to about 98 percent of the planar surface of the first mechanical fastener component is found only in dependent claims 8 and 20.

Discussion

The initial burden of establishing a *prima facie* basis to deny patentability to a claimed invention rests upon the examiner. *In re Piasecki,* 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984). In making a rejection on the ground that claimed subject matter would inherently be present in the apparatus or process described by a reference, the examiner bears the initial burden of making out a *prima facie* case, as by providing a basis in fact and/or technical reasoning which reasonably supports the position that what is allegedly inherent would necessarily flow from the teachings of the prior art. *See Ex parte Levy,* 17 USPQ2d 1461, 1464 (BPAI 1990) and the cases cited therein. If examination at the initial stage does not produce a *prima facie* case of unpatentability, then without more the applicant is entitled to a patent. *In re Oetiker,* 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1990).

The main issue in this case is whether Roessler discloses a fastener tab comprising a substrate and a mechanical fastener component wherein the tab has a Gurley stiffness value of less than about 1000 milligrams in the area of the tab that includes the mechanical fastener component. Because we do not agree with the examiner that the claimed invention necessarily flows from the disclosure of Roessler, we will not sustain the examiner's rejection.

The Roessler reference cited by the examiner against the appealed claims discloses, in pertinent part, a mechanical fastener tab 30 of the hook-and-loop type that is suitable for use on a disposable absorbent product. Beginning at column 6, line 29, and continuing to column 9, line 2, Roessler goes into considerable detail concerning the nature of the hook material and the loop material components of the mechanical fastener; however, it is not disputed that Roessler makes no mention whatsoever of the Gurley stiffness value of any of these fastener tab components. Nevertheless, the examiner takes the position that "[[t]he Roessler article comprises similar materials as recited in applicants' invention, therefore the Gurley stiffness value is considered to be the same [as that recited in the claims]" (final rejection, page 2). We surmise from this that the examiner considers the teachings of Roessler at, for example, column 6, line 29, through column 7, line 13, to be of such kind that a fastener tab having the claimed Gurley stiffness value would necessarily flow from making a fastener tab in accordance with these teachings.

In our view, the examiner has provided no basis in fact and/or technical reasoning which reasonably supports the above stated theory of inherency. More particularly, we find appellants' reasoning on pages 3-4 of the brief, which the examiner has not even attempted to refute, as to why the allegedly inherent Gurley stiffness value does *not* necessarily flow from Roessler's teachings to be persuasive. In brief, appellants argue that while the hook material described by Roessler appears to be like the hook material described on page 18 of appellants' specification in connection with example 1, this alone is not enough to establish that the area of the fastener tab in question[4] necessarily has a Gurley stiffness value within the claimed range. In that appellants' specification clearly points out[5] that the Gurley stiffness value at the claimed area is influenced by the physical properties of both the hook material *and* the substrate, appellants' argument is well taken. In addition, and as aptly pointed out by appellants on page 4 of the brief, fastener tabs made using the hook material described on page 18 of appellants' specification, which material is akin to that disclosed in Roessler, may or may not fall within the claimed Gurley stiffness value depending on the characteristics of the substrate. In light of this well reasoned argument, the examiner's unvarnished position to the effect that the claimed subject matter would necessarily result from using Roessler's hook material simply because the hook material of the reference is similar to that used by appellants in making the claimed invention cannot be sustained.

---

[4] That is, the area of the fastening tab that includes both the hook material and the substrate.

[5] See, for example, page 7, line 18, through page 8, line 15, and page 9, lines 6-15, of appellants' specification.

We are likewise in agreement with appellants that there is no factual basis for the examiner's contention (final rejection, page 2; answer, pages 3-4) that Gurley stiffness values can vary from sample to sample, such that even if Roessler stated a Gurley stiffness value, there would be no way to correlate a Roessler value with the claimed values. The examiner's contention (final rejection, page 3; answer, page 4) that the burden is on appellants to prove that the fastening tabs of Roessler will not have a Gurley stiffness value within the claimed range is simply wrong. *See In re Oetiker*, 977 F.2d at 1445, 24 USPQ2d at 1444.

We have also considered whether Roessler would have rendered obvious a fastener tab having a Gurley stiffness value of less than about 1000 milligrams in the area of the fastening tab that includes the first mechanical fastener component, but find nothing in Roessler that would have suggested the claimed subject matter. Further, the examiner does not contend, and it is not apparent to us, that Flug makes up for the deficiencies of Roessler in this respect.

In view of the foregoing, the examiner's rejection of claims 1-54 as being unpatentable over Roessler in view of Flug cannot be sustained.

The decision of the examiner is therefore reversed.

REVERSED

IRWIN CHARLES COHEN)
Administrative Patent Judge)
)
)
Lawrence J. Staab)
LAWRENCE J. STAAB) BOARD OF PATENT
Administrative Patent Judge) APPEALS
) AND
) INTERFERENCES
John McQuade)
JOHN P. McQUADE)
Administrative Patent Judge)

LJS/lp

Declaration of Christian Almberg Under 37 CFR 1.132

In re U.S. Patent Appln. No. 10/684,585

I, Christian Almberg, of Grönstensvägen 15, 435 41 Mölnlycke, Sweden, hereby declare that:

1. I am the co-inventor of the above-identified Patent Application.

2. I have been asked by the Patent Department of my employer, SCA Hygiene Products AB, S-405 03 Göteborg, to explain, as far as I can recall, the background to the above-identified invention.

3. In early 2000, my employer had furnished two nursing homes (St. Anna, Herentals, Belgium and Ter Berken, Roeselare, Belgium) with trial samples of a new belted product in order to evaluate the performance of the product in real-life conditions. During the trial, we were made aware of the fact that samples were failing due to the belt-halves detaching from the absorbent chassis. I was asked by our project manager, Kerstin Björnson, to investigate the cause of failure and, if possible, to propose a remedy.

4. The investigation showed that, although the belt halves seemed to be adequately attached when they were pulled in their length direction, i.e. the transverse direction of the product, they had a tendency to fail at relatively low forces if the forces were applied at increasing angles to the transverse direction.

5. As stated in the specification, depending on the size of the wearer, the angle α between the belt halves and the absorbent structure will vary, thereby varying the tension forces exerted on the joint between the belt halves and the absorbent structure.

6. Together with my colleague, Lucas Bäck, we sought a solution to the problem of the belt halves releasing prematurely at increasing angles to the transverse direction. We were able to establish that there existed a surprising and unexpected relationship for a given force between the angle at which the force was applied and the time it took for the belt half to become detached from the product. For a product to be sufficiently reliable in use, we could ascertain for what minimum periods of time the joint between the belt half and the absorbent chassis would have to withstand a particular force at a particular angle.

7. We determined that when each of said joints between each said belt half and said absorbent structure is such that when each said belt half is subjected to a tension force of 35 N acting along said longitudinal axis of the belt and said longitudinal axis of the belt creates an angle (α) to said transverse axis of said absorbent structure, and when the following minimum average release times (t) of each said belt half from said absorbent structure were attained:

When $\alpha = 10°$, $t \geq 720$ seconds;
When $\alpha = 20°$, $t \geq 330$ seconds;
When $\alpha = 25°$, $t \geq 240$ seconds;
When $\alpha = 30°$, $t \geq 180$ seconds; and
When $\alpha = 40°$, $t \geq 75$ seconds;

then the aforementioned problems of product failure were resolved.

8. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such wilful false statements may jeopardize the validity of the application or any patent issued thereon.

Gothenburg, June 2006-06-29

Christian Almberg

US004001674B2

United States Statutory Invention Registration [19]

Ames et al.

[11] **Reg. Number: H1674**

[45] **Published: Aug. 5, 1997**

[54] **CONVERTIBLE BELTED DIAPER**

[76] Inventors: **Kathleen Quinlan Ames**; **Merlene Adams Cummins**; **Gayle Rose Bushman**, all of 6100 Center Hill Rd., Cincinnati, Ohio 45224

[21] Appl. No.: **384,201**

[22] Filed: **Feb. 3, 1995**

Related U.S. Application Data

[63] Continuation of Ser. No. 184,618, Jan. 19, 1994, abandoned.

[51] **Int. Cl.**^{6} **A61F 13/15**

[52] **U.S. Cl.** **604/389**; 604/385.1; 604/386; 604/396

[58] **Field of Search** 604/385.1–387, 604/389, 396–402; 2/72, 76, 213, 226, 236, 919, 400, 402–403, 406, 408

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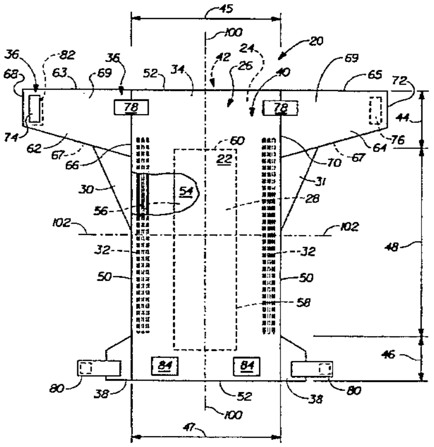
Primary Examiner—Michael J. Carone
Assistant Examiner—Theresa M. Wesson

[57] **ABSTRACT**

An absorbent article such as a disposable diaper, incontinence brief, diaper holder, training pant or the like, having a fastening system that provides the user with different options as to how the absorbent article will be constructed and fitted to the wearer. The fastening system allows the wearer to choose between conventional, belted, and pull-up diaper configurations. Further, the fastening system is designed to ensure easy changing and removal of the absorbent article as well as easy inspection for soiling. Such absorbent articles comprise a containment assembly generally comprising a liquid pervious topsheet, a liquid impervious backsheet, an absorbent core disposed between the topsheet and the backsheet, first and second belt flaps extending laterally outwardly from opposite sides of the containment assembly, and a refastenable fastening system comprising a first fastening assembly and a second fastening assembly. The first fastening assembly is designed for constructing the absorbent article in a belted configuration. The second fastening assembly, designed as an alternative to the first fastening assembly, provides a system for fastening the absorbent article in a conventional configuration.

15 Claims, 8 Drawing Sheets

A statutory invention registration is not a patent. It has the defensive attributes of a patent but does not have the enforceable attributes of a patent. No article or advertisement or the like may use the term patent, or any term suggestive of a patent, when referring to a statutory invention registration. For more specific information on the rights associated with a statutory invention registration see 35 U.S.C. 157.



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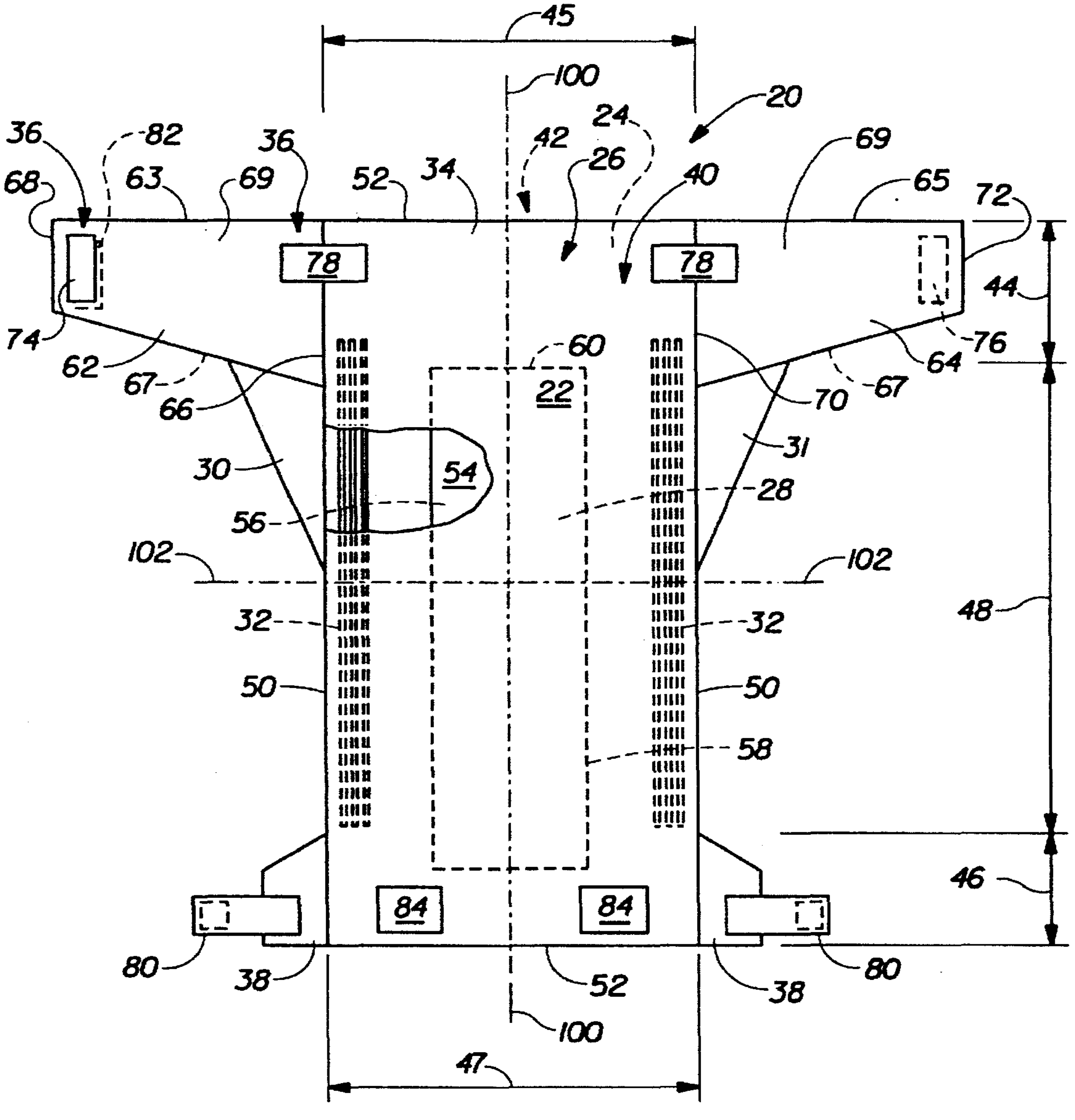


Fig. 1

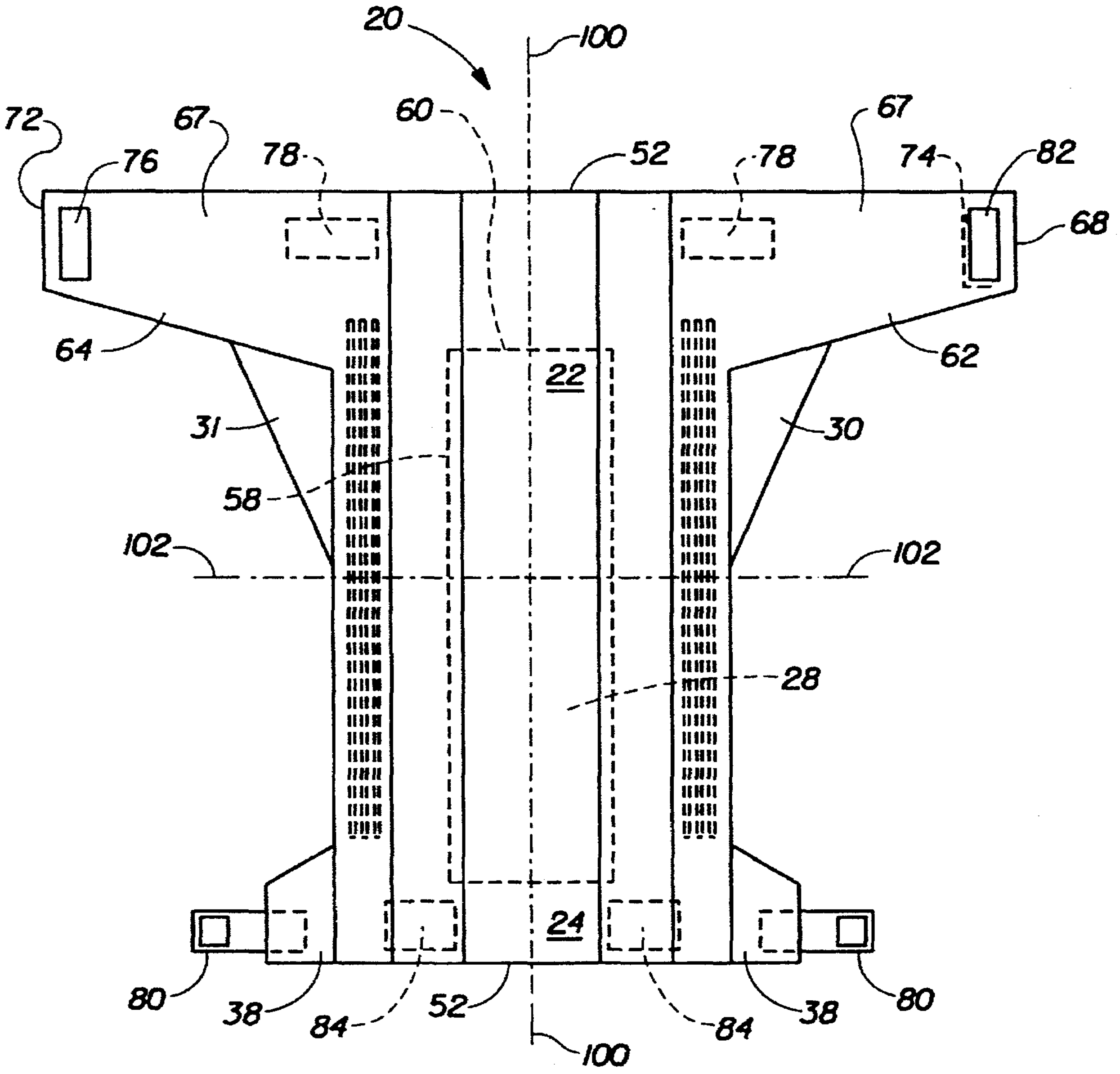


Fig. 2

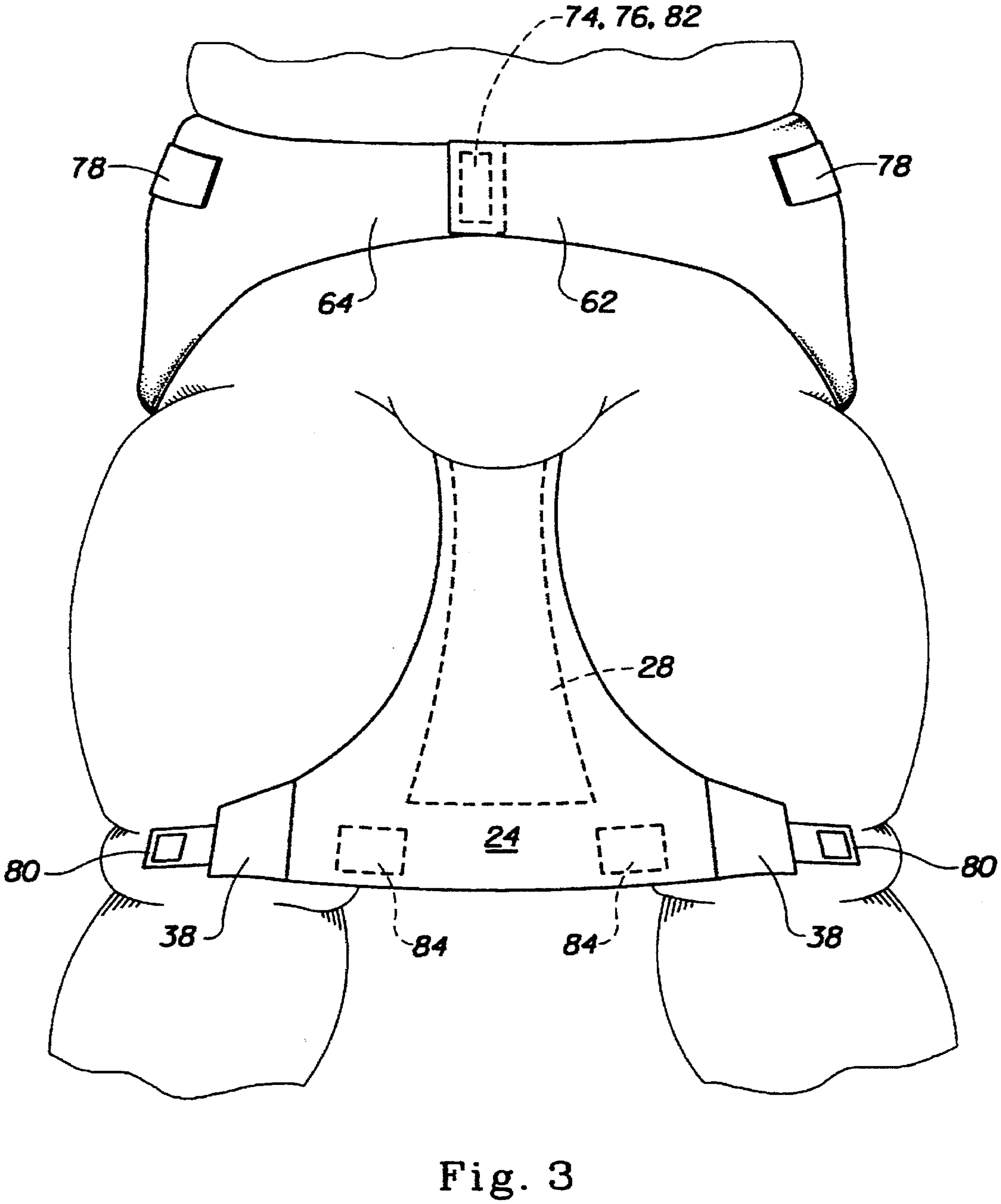


Fig. 3

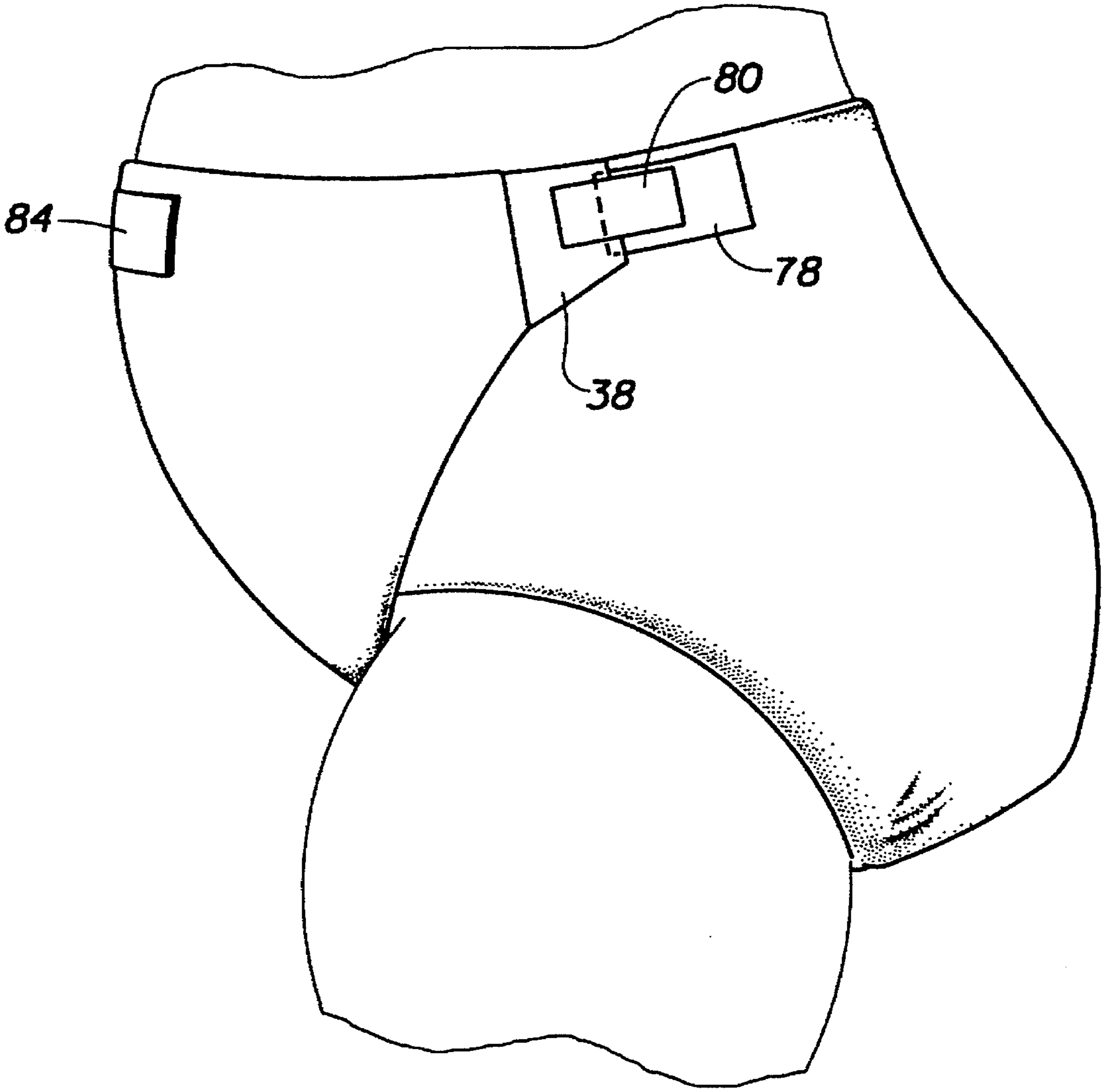


Fig. 4

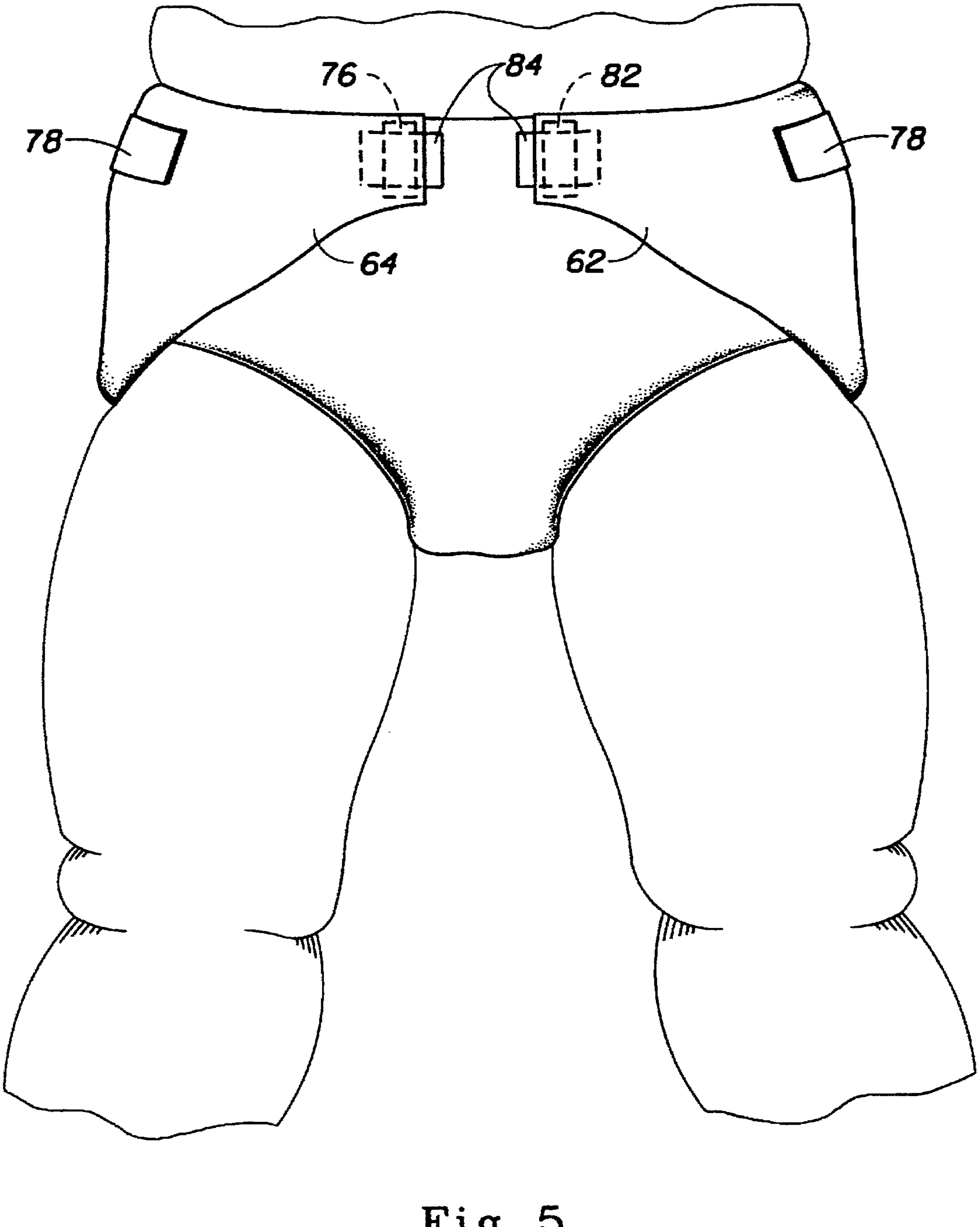


Fig. 5

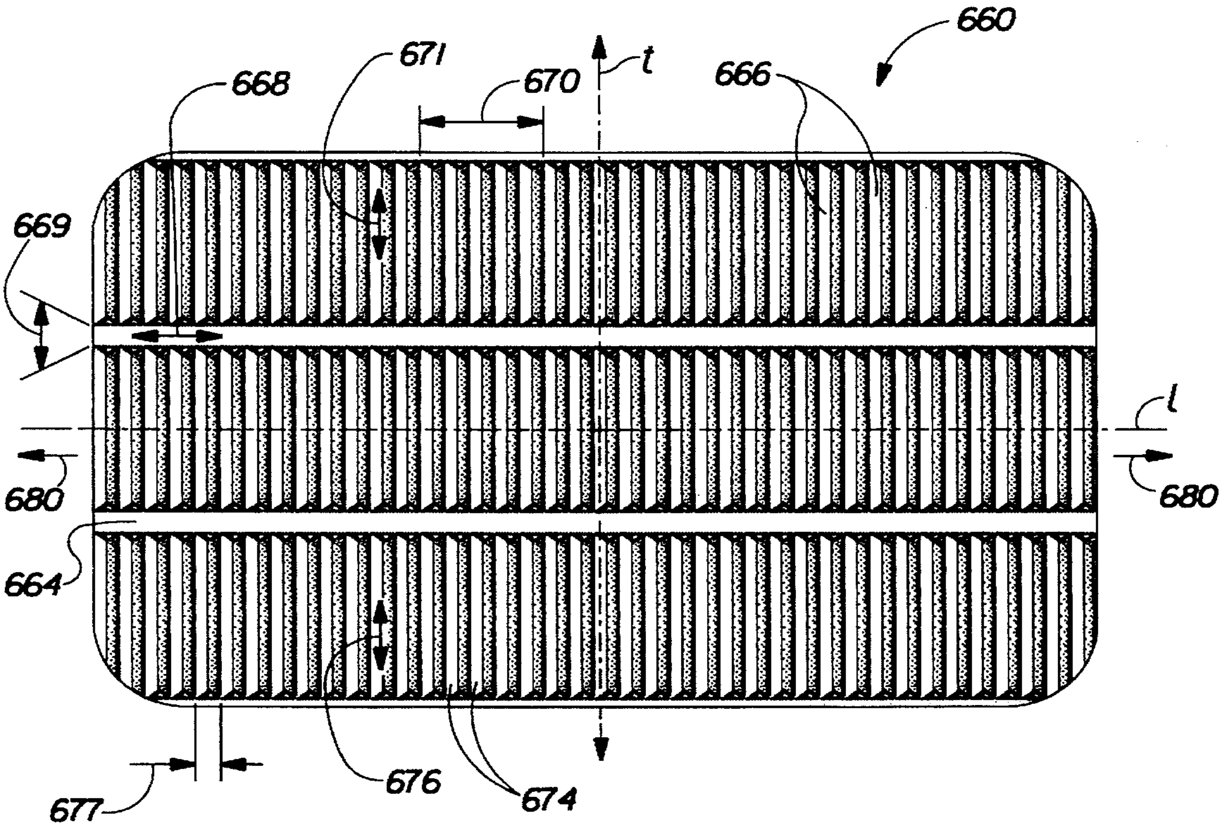


Fig. 6

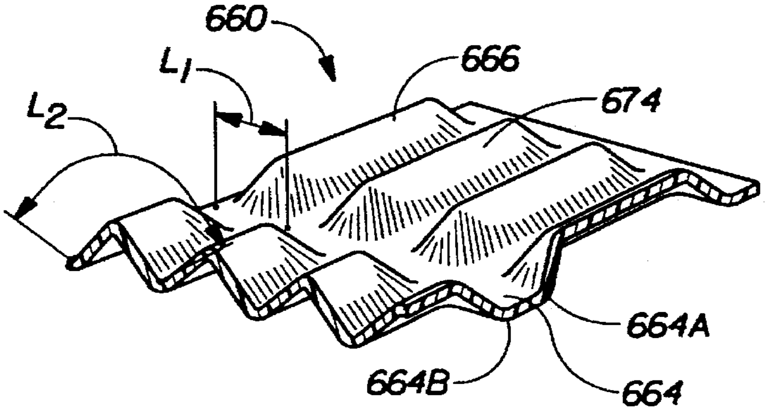


Fig. 7

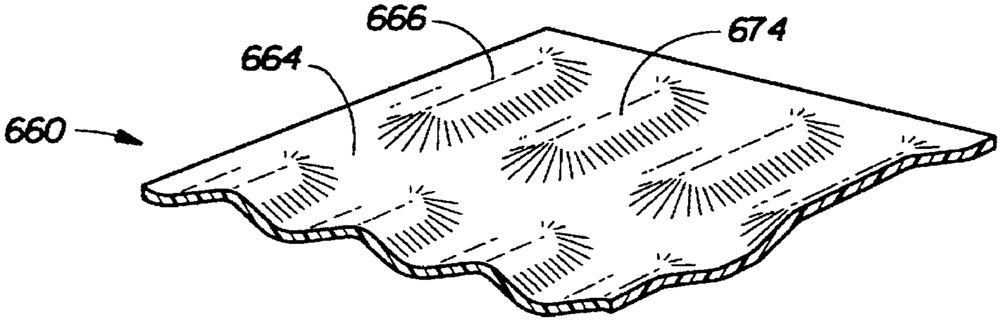


Fig. 8

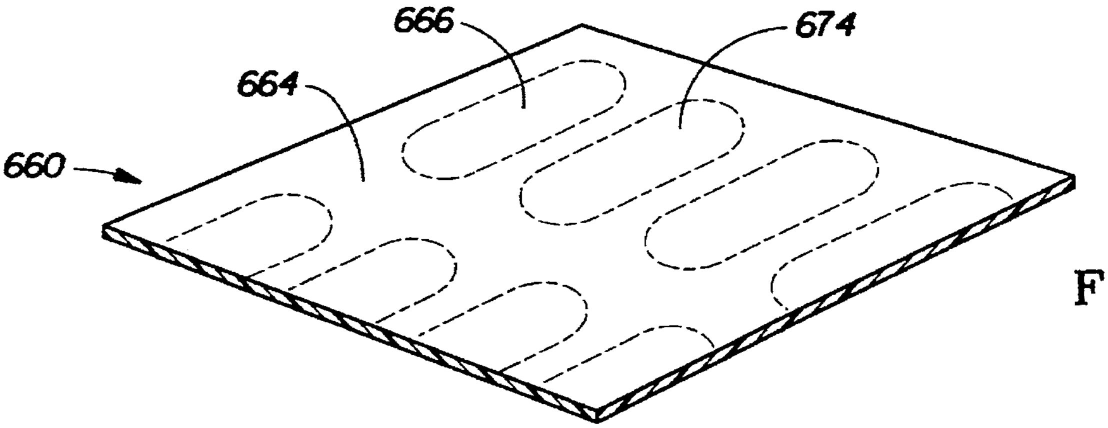
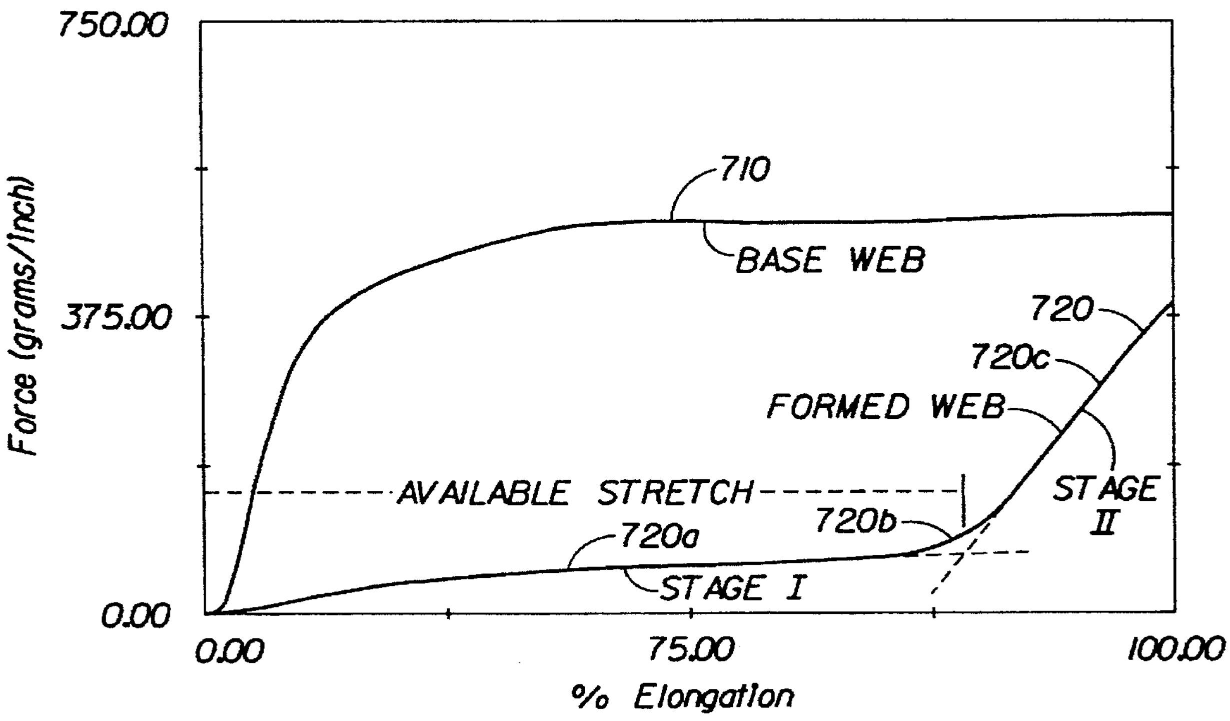


Fig. 9


750.00
375.00
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Force (grams/Inch)
0.00
75.00
100.00
% Elongation
710
BASE WEB
720
720c
FORMED WEB
STAGE II
AVAILABLE STRETCH
720b
720a
STAGE I

Fig. 10

CONVERTIBLE BELTED DIAPER

This is a continuation of application Ser. No. 08/184,618, filed on Jan. 19, 1994, now abandoned.

FIELD OF INVENTION

The present invention relates to absorbent articles such as diapers, incontinence briefs, diaper holders, training pants and the like, and more particularly, to absorbent articles having a fastening system that provides the user with different options as to how the diaper will be constructed and fitted to the wearer.

BACKGROUND OF THE INVENTION

Infants and other incontinent individuals wear absorbent articles such as diapers to receive and contain urine and other body exudates. Absorbent articles function both to contain discharged materials and to isolate the materials from the body of the wearer and from the wearer's garments and bed clothing. Disposable absorbent articles having many different basic designs are known to the art. For example, U.S. Pat. No. Re. 26,152, entitled "Disposable Diaper" issued to Duncan and Baker on Jan. 31, 1967 describes a conventional disposable diaper which has achieved worldwide acceptance and commercial success. Further, U.S. Pat. No. 4,964,860 entitled "Detachable Two Piece Absorbent Garment" issued to Gipson et al. on Oct. 23, 1990 discloses a belted absorbent article. Finally, U.S. Pat. No. 5,246,433 entitled "Elasticized Disposable Training Pant And Method of Making The Same" issued to Hasse et al. on Sep. 21, 1993 discloses a unitary disposable absorbent article that can be used as a training pant. However, the absorbent articles currently available to the public fail to provide many of the benefits that could be achieved by absorbent articles having a fastening system that allows the user to choose the most desirable diaper configuration for each particular use.

In the market today, the consumer has a number of different basic diaper designs to choose from depending on the desired options, comfort and cost, including conventional diapers, belted diapers, and "pull-up" type training pants. Conventional diaper designs are generally the least expensive type of absorbent article to produce and are generally acceptable for use on small babies and persons who are sick or otherwise confined to a bed. A conventional diaper is fitted to the wearer by first placing a portion of the diaper under the wearer (generally, the back portion of the diaper is placed under the buttocks and rear waist of the wearer) and then pulling the remainder of the diaper through the wearer's legs. The rear portion of the diaper is then attached to the front portion of the diaper on each side of the wearer. However, such conventional configurations tend to be very difficult to use when the wearer refuses to remain still throughout the period of application. Further, adult wearers often find the conventional type absorbent articles difficult to put on themselves without assistance. Further, the conventional absorbent article configuration lacks an easy method for inspection without complete removal of the absorbent article.

Belted diapers have been introduced to overcome some of the problems with the conventional type diapers. Belted diapers are generally fitted to the wearer by positioning the diaper such that the belt can be fastened about the waist of the wearer with the remainder of the diaper hanging down between the legs of the wearer. The part of the diaper hanging down from the waist is then pulled through the legs of the wearer and attached to the belted part of the diaper

near the waist. Thus, a belted diaper can be fitted to standing wearers and can be easily inspected for soiling without completely removing the diaper. Further, adult wearers often find the belted absorbent article designs easier to put on without assistance. However, belted diapers are generally more costly than conventional diapers and some wearers prefer the conventional design to the belted design.

Another popular diaper design has been the "pull-up" type, used in training pants and incontinence briefs. The "pull-up" design allows the wearer to pull the absorbent article on as pants and does not require any of the fastening steps of the conventional or belted type absorbent article designs. Although this feature is desirable for many adult users and children in their toilet training stage, the "pull-up" design is impractical for many users. Current "pull-up" designs lack any features that allow the diaper to be checked for soiling without removal of the diaper and the wearer's outer clothing.

Thus, it would be advantageous to provide an absorbent article having a fastening system that allows the user to construct and fasten the absorbent article in different configurations.

Therefore, it is an objective of the present invention to provide an absorbent article having a refastenable fastening system designed to allow the absorbent article to be constructed in a conventional, belted or "pull-up" configuration.

These and other objectives of the present invention will be more readily apparent when considered in reference to the following description and when taken in conjunction with the accompanying drawings.

SUMMARY OF THE INVENTION

The present invention provides absorbent articles such as disposable diapers, incontinent briefs, diaper holders, training pants and the like, having a fastening system that provides the user with different options as to how the absorbent article will be constructed and fitted to the wearer. The fastening systems allow the wearer to choose between conventional, belted, and pull-up diaper configurations. Further, the fastening systems are designed to ensure easy changing and removal of the absorbent article as well as easy inspection for soiling. Such absorbent articles comprise a containment assembly generally comprising a liquid pervious topsheet, a liquid impervious backsheet, an absorbent core disposed between the topsheet and the backsheet; first and second belt flaps extending outwardly from opposite sides of the containment assembly; and a refastenable fastening systems comprising a first fastening assembly for fastening the diaper in a belted configuration, and a second fastening assembly for fastening the diaper in a conventional configuration.

The first fastening assembly is designed for constructing the absorbent article in a belted configuration. Accordingly, the first fastening assembly comprises fastening elements disposed on the first belt flap and the second belt flap of the absorbent article, the outer surface of the belt, and the inner surface of the containment assembly in the front section. In use, the belted configuration is constructed by engaging the fastening element disposed on the first belt flap with the fastening element disposed on the second belt flap to form a belt. The fastening elements disposed on the front section of the containment assembly are then engaged with the fastening elements disposed on the outer surface of the belt to complete the construction in the belted configuration.

The second fastening assembly, designed as an alternative to the first fastening assembly, provides a system for fastening the absorbent article in a conventional configuration. Accordingly, the second fastening assembly comprises fastening members disposed on the inner surface of the first belt flap and the second belt flap and a fastening element disposed on the outer surface of the containment assembly in the front section. The absorbent article is constructed in the conventional configuration by engaging the fastening elements disposed on the first belt flap and the second belt flap with the fastening element disposed on the outer surface of the containment assembly in the front section.

In a preferred embodiment of the present invention, the diaper constructed in either the belted or the conventional configuration can be pulled on and off as a training pant. This option is provided by the special stretch characteristics of the waist and belt features. The waist and belt features are capable of maintaining sufficient tension to hold the diaper on the wearer throughout the period of use while providing enough stretch to allow the diaper to pulled down over the wearer's hips without detaching the fasteners. Thus, in a preferred embodiment of the present invention, the design of the diaper and the fastening system provides a diaper that can be fitted to the wearer in a conventional configuration or a belted configuration, either of which may be pulled on and off as a training pant if desired.

BRIEF DESCRIPTION OF THE DRAWINGS

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as forming the present invention, it is believed that the invention will be better understood from the following description which is taken in conjunction with the accompanying drawings in which like designations are used to designate substantially identical elements and in which:

FIG. 1 is a plan view of a disposable diaper embodiment of the present invention having portions cut away to reveal underlying structure, the outer surface of the diaper is facing the viewer;

FIG. 2 is a plan view of a disposable diaper embodiment of the present invention, the inner surface of the diaper is facing the viewer;

FIG. 3 is a front elevational view of the diaper being fitted onto the wearer in the belted configuration;

FIG. 4. is a side elevational view of the diaper fitted onto the wearer in the belted configuration;

FIG. 5 is a front elevational view of the diaper fitted onto the wearer in the conventional configuration;

FIG. 6 is a plan view drawing of a preferred embodiment of a polymeric web material having a strainable network with the deformations facing the viewer;

FIG. 7 is a segmented, perspective illustration of the polymeric web material of FIG. 6 in an untensioned condition;

FIG. 8 is a segmented, perspective illustration of the polymeric web material of FIG. 6 in a tensioned condition corresponding to stage I on the force-elongation curve depicted in FIG. 10;

FIG. 9 is a segmented, perspective illustration of the polymeric web material of FIG. 6 in a tensioned condition corresponding to stage II on the force-elongation curve depicted in FIG. 10;

FIG. 10 is a graph of the resistive force verses percent elongation comparing the behavior of the polymeric web material of FIG. 6, with an otherwise identical, planar base polymeric web material.

DETAILED DESCRIPTION OF THE INVENTION

As used herein, the term "absorbent article" refers to devices which absorb and contain body exudates, and, more specifically, refers to devices which are placed against or in proximity to the body of the wearer to absorb and contain the various exudates discharged from the body. The term "disposable" is used herein to describe absorbent articles which are not intended to be laundered or otherwise restored or reused as an absorbent article (i.e., they are intended to be discarded after a single use and, preferably, to be recycled, composted or otherwise disposed of in an environmentally compatible manner). A "unitary" absorbent article refers to absorbent articles which are formed of separate parts united together to form a coordinated entity so that they do not require separate manipulative parts like a separate holder and liner. A preferred embodiment of an absorbent article of the present invention is the disposable absorbent article, diaper **20**, shown in **FIG. 1**. As used herein, the term "diaper" refers to an absorbent article generally worn by infants and incontinent persons that is worn about the lower torso of the wearer. It should be understood, however, that the present invention is also applicable to other absorbent articles such as incontinence briefs, incontinence undergarments, diaper holders and liners, feminine hygiene garments, training pants, and the like.

FIG. 1 is a plan view of the diaper **20** of the present invention in its flat-out, uncontracted state (i.e., with elastic induced contraction pulled out) with portions of the structure being cut-away to more clearly show the construction of the diaper **20** and with the portion of the diaper **20** which faces away from the wearer, the outer surface **40**, facing the viewer. As shown in FIG. **1**, the diaper **20** preferably comprises a containment assembly **22** comprising a liquid pervious topsheet **24**; a liquid impervious backsheet **26** joined to the topsheet; and an absorbent core **28** positioned between the topsheet **24** and the backsheet **26**. The diaper preferably further comprises elasticized leg cuffs **32**; ear flaps **38**; an elastic waist feature **34**; a first belt flap **62**; a second belt flap **64**; a first thigh panel **30**; a second thigh panel **31**; and a fastening system **36** comprising a first fastening assembly for constructing the diaper **20** in a belted configuration, and a second fastening assembly for fastening the diaper **20** in a conventional configuration.

The diaper **20** is shown in FIG. **1** to have an outer surface **40** (facing the viewer in FIG. 1), an inner surface **42** opposed to the outer surface **40**, a rear waist region **44**, a front waist region **46** opposed to the rear waist region **44**, a crotch region **48** positioned between the rear waist region **44** and the front waist region **46**, and a periphery which is defined by the outer perimeter or edges of the diaper **20** in which the longitudinal edges are designated **50** and the end edges are designated **52**. The inner surface **42** of the diaper **20** comprises that portion of the diaper **20** which is positioned adjacent to the wearer's body during use (i.e., the inner surface **42** generally is formed by at least a portion of the topsheet **24** and other components joined to the topsheet **24**). The outer surface **40** comprises that portion of the diaper **20** which is positioned away from the wearer's body (i.e., the outer surface **40** is generally formed by at least a portion of the backsheet **26** and other components joined to the backsheet **26**). As used herein, the term "joined" encompasses configurations whereby an element is directly secured to the other element by affixing the element directly to the other element, and configurations whereby the element is indirectly secured to the other element by affixing the element to intermediate member(s) which in turn are affixed to the other element. The rear waist region **44** and the front waist region **46** extend from the end edges **52** of the periphery to the crotch region **48**. The rear waist region **44** comprises a central region **45** and two belt flaps, the first belt flap **62**, and the second belt flap **64**, which typically comprise the outer lateral portions of the rear waist region **44**. The front waist region **46** comprises a central region **47** and a pair of ear flaps designated **38**, which typically comprise the outer lateral portions of the front waist region **46**.

The diaper **20** also has two centerlines, a longitudinal centerline **100** and a transverse centerline **102**. The term "longitudinal", as used herein, refers to a line, axis, or direction in the plane of the diaper **20** that is generally aligned with (e.g. approximately parallel with) a vertical plane which bisects a standing wearer into left and right halves when the diaper **20** is worn. The terms "transverse" and "lateral", as used herein, are interchangeable and refer to a line, axis or direction which lies within the plane of the diaper that is generally perpendicular to the longitudinal direction (which divides the wearer into front and back body halves).

The containment assembly **22** of the diaper **20** is shown in FIG. **1** as comprising the main body (chassis) of the diaper **20**. The containment assembly **22** comprises at least an absorbent core **28** and preferably an outer covering layer comprising the topsheet **24** and the backsheet **26**. When the absorbent article comprises a separate holder and a liner, the containment assembly **22** generally comprises the holder and the liner (i.e., the containment assembly **22** comprises one or more layers of material to define the holder while the liner comprises an absorbent composite such as a topsheet, a backsheet, and an absorbent core.) For unitary absorbent articles, the containment assembly **22** comprises the main structure of the diaper with other features added to form the composite diaper structure. Thus, the containment assembly **22** for the diaper **20** generally comprises the topsheet **24**, the backsheet **26**, and the absorbent core **28**.

FIG. **2** shows a preferred embodiment of the containment assembly **22** in which the topsheet **24** and the backsheet **26** have length and width dimensions generally larger than those of the absorbent core **28**. The topsheet **24** and the backsheet **26** extend beyond the edges of the absorbent core **28** to thereby form the periphery of the diaper **20**. While the topsheet **24**, the backsheet **26**, and the absorbent core **28** may be assembled in a variety of well known configurations, exemplary containment assembly configurations are described generally in U.S. Pat. No. 3,860,003 entitled "Contractible Side Portions for Disposable Diaper" which issued to Kenneth B. Buell on Jan. 14, 1975; and U.S. Pat. No. 5,151,092 entitled "Absorbent Article With Dynamic Elastic Waist Feature Having A Predisposed Resilient Flexural Hinge" which issued to Kenneth B. Buell et al., on Sep. 29, 1992; each of which is incorporated herein by reference.

The absorbent core **28** may be any absorbent member which is generally compressible, conformable, non-irritating to the wearer's skin, and capable of absorbing and retaining liquids such as urine and other certain body exudates. As shown in FIG. **1**, the absorbent core **28** has a garment-facing side **54**, a body-facing side **56**, a pair of side edges designated **58**, and a pair of waist edges designated **60**. The absorbent core **28** may be manufactured in a wide variety of sizes and shapes (e.g., rectangular, hourglass, "T"-shaped, asymmetric, etc.) and from a wide variety of liquid-absorbent materials commonly used in disposable diapers and other absorbent articles such as comminuted wood pulp which is generally referred to as airfelt. Examples of other suitable absorbent materials include creped cellulose wadding; meltblown polymers including coform; chemically stiffened, modified or cross-linked cellulosic fibers; tissue including tissue wraps and tissue laminates; absorbent foams; absorbent sponges; superabsorbent polymers; absorbent gelling materials; or any equivalent material or combinations of materials.

The configuration and construction of the absorbent core **28** may vary (e.g., the absorbent core may have varying caliper zones, a hydrophilic gradient, a superabsorbent gradient, or lower average density and lower average basis weight acquisition zones; or may comprise one or more layers or structures). Further, the size and absorbent capacity of the absorbent core **28** may also be varied to accommodate wearers ranging from infants through adults. However, the total absorbent capacity of the absorbent core **28** should be compatible with the design loading and the intended use of the diaper **20**.

One embodiment of the diaper **20** has an asymmetric, modified T-shaped absorbent core **28** having ears in the first waist region but a generally rectangular shape in the second waist region. Exemplary absorbent structures for use as the absorbent core **28** of the present invention that have achieved wide acceptance and commercial success are described in U.S. Pat. No. 4,610,678 entitled "High-Density Absorbent Structures" issued to Weisman et al. on Sep. 9, 1986; U.S. Pat. No. 4,673,402 entitled "Absorbent Articles With Dual-Layered Cores" issued to Weisman et al. on Jun. 16, 1987; U.S. Pat. No. 4,888,231 entitled "Absorbent Core Having A Dusting Layer" issued to Angstadt on Dec. 19, 1989; and U.S. Pat. No. 4,834,735, entitled "High Density Absorbent Members Having Lower Density and Lower Basis Weight Acquisition Zones", issued to Alemany et al. on May 30, 1989. The absorbent core may further comprise the dual core system containing an acquisition/distribution core of chemically stiffened fibers positioned over an absorbent storage core as detailed in U.S. Pat. No. 5,234,423, entitled "Absorbent Article With Elastic Waist Feature and Enhanced Absorbency" issued to Alemany et al., on Aug. 10, 1993; and in U.S. Pat. No. 5,147,345, entitled "High Efficiency Absorbent Articles For Incontinence Management" issued to Young, LaVon and Taylor on Sep. 15, 1992. All of these patents are incorporated herein by reference.

The backsheet **26** is positioned adjacent the garment-facing surface **54** of the absorbent core **28** and is preferably joined thereto by attachment means (not shown) such as those well known in the art. For example, the backsheet **26** may be secured to the absorbent core **28** by a uniform continuous layer of adhesive, a patterned layer of adhesive, or an array of separate lines, spirals, or spots of adhesive. Adhesives which have been found to be satisfactory are manufactured by H. B. Fuller Company of St. Paul, Minn. and marketed as HL-1258. An example of a suitable attachment means comprising an open pattern network of filaments of adhesive is disclosed in U.S. Pat. No. 4,573,986 entitled "Disposable Waste-Containment Garment", which issued to Minetola et al. on Mar. 4, 1986. Another suitable attachment means comprising several lines of adhesive filaments swirled into a spiral pattern is illustrated by the apparatus and methods shown in U.S. Pat. No. 3,911,173 issued to Sprague, Jr. on Oct. 7, 1975; U.S. Pat. No. 4,785,996 issued to Ziecker, et al. on Nov. 22, 1978; and U.S. Pat. No. 4,842,666 issued to Werenicz on Jun. 27, 1989. Each of these patents are incorporated herein by reference. Alternatively, the attachment means may comprise heat bonds, pressure bonds, ultrasonic bonds, dynamic mechanical bonds, or any other suitable attachment means or combinations of these attachment means as are known in the art. Embodiments of the present invention are also contemplated wherein the absorbent core is not joined to the backsheet **26**, the topsheet **24**, or both in order to provide greater extensibility in the front waist region **46** and the rear waist region **44**.

The backsheet **26** is impervious to liquids (e.g., urine) and is preferably manufactured from a thin plastic film, although other flexible liquid impervious materials may also be used. As used herein, the term "flexible" refers to materials which are compliant and will readily conform to the general shape and contours of the human body. The backsheet **26** prevents the exudates absorbed and contained in the absorbent core **28** from wetting articles which contact the diaper **20** such as bedsheets and undergarments, however, the backsheet **26** may permit vapors to escape from the absorbent core **28** (i.e., is breathable). Thus, the backsheet **26** preferably comprises a woven or nonwoven material, polymeric films such as thermoplastic films of polyethylene or polypropylene, or composite materials such as a film-coated nonwoven material. A suitable backsheet **26** is a thermoplastic film having a thickness of from about 0.012 mm (0.5 mil) to about 0.051 mm (2.0 mils). Preferably, the backsheet **26** is embossed and/or matte finished to provide a more clothlike appearance.

In preferred embodiments of the present invention, at least a portion of the backsheet **26** is subjected to mechanical stretching in order to provide both a "zero strain" stretch laminate that forms the thigh panels **30** and **31** and to prestrain the portion of the backsheet **26** coinciding with the elastic waist feature **34**. The backsheet **26** can be prestrained by directing the backsheet through an incremental mechanical stretching system similar to the operation described with respect to the formation of the "zero strain" stretch laminate backsheet and elasticized side panels in U.S. Pat. No. 5,151,092 entitled "Absorbent Article With Dynamic Elastic Waist Feature Having A Predisposed Resilient Flexural Hinge", issued to Buell et al., on Sep. 29, 1992. Accordingly, the backsheet is preferably elongatable, more preferably drawable, but not necessarily elastomeric, so that the backsheet **26** will, upon mechanical stretching, be at least to a degree permanently elongated such that it will not fully return to its original undistorted configuration. In preferred embodiments, the backsheet **26** can be subjected to mechanical stretching without undue rupturing or tearing. Thus, it is preferred that the backsheet **26** have an ultimate elongation to break of at least 400% to about 700% in the cross-machine direction as measured using a method consistent with ASTM (American Society of Testing Materials) D-638. Films suitable for use as the backsheet **26** generally contain a high content of linear low density polyethylene. The Clopay Corporation of Cincinnati, Ohio, manufactures a suitable backsheet under the designation 1401. Other suitable materials for the backsheet **26** include RR8220 blown films and RR5475 cast films as manufactured by Tredegar Industries, Inc. of Terre Haute, Ind.

Alternatively, the backsheet **26** or portions of the backsheet **26** may comprise a structural elastic-like film (SELF) web. A structural elastic-like film web is an extensible material that exhibits an elastic-like behavior in the direction of elongation without the use of added elastic materials. The SELF web includes a strainable network having at least two contiguous, distinct, and dissimilar regions. One of the regions is configured so that it will exhibit resistive forces in response to an applied axial elongation in a direction parallel to the predetermined axis before a substantial portion of the other region develops significant resistive forces to the applied elongation. At least one of the regions has a surface-path length which is greater than that of the other region as measured substantially parallel to the predetermined axis while the material is in an untensioned condition. The region exhibiting the longer surface-path length includes one or more deformations which extend beyond the plane of the other region. The SELF web exhibits at least two significantly different stages of controlled resistive force to elongation along at least one predetermined axis when subjected to an applied elongation in a direction parallel to the predetermined axis. The SELF web exhibits first resistive forces to the applied elongation until the elongation of the web is sufficient to cause a substantial portion of the region having the longer surface-path length to enter the plane of applied elongation, whereupon the SELF web exhibits second resistive forces to further elongation. The total resistive forces to elongation are higher than the first resistive forces to elongation provided by the first region.

The strainable web material can, in a preferred embodiment, comprise a formed polymeric film. The strainable web material can be made of a base material that has a relatively low extensibility under the forces the diaper is normally subjected to when worn. When formed into the strainable web material as described herein, however, the base material, thus formed, will be extensible under these forces. The strainable web material can also be formed into a structure that provides a "force wall" to be created at specific, pre-selected elongations and forces. The strainable web material is preferably comprised substantially of linear low density polyethylene (LLDPE). The strainable web material may also be comprised of other polyolefins such as polyethylenes, including low density polyethylene (LDPE), ultra low density polyethylene (ULDPE), high density polyethylene (HDPE), or polypropylene and blends thereof with the above and other materials. Examples of other suitable polymeric materials which may also be used include, but are not limited to polyester, polyurethanes, compostable or biodegradable polymers, heat shrink polymers, thermoplastic elastomers, and breathable polymeric structures.

The strainable web material can be used in various different forms in the diaper **20**. One example of a suitable form of structural elastic-like film is a laminate. The laminate comprises a strainable web material secured between two longitudinally extensible, preferably carded nonwoven webs. (In addition, the strainable web material can also be used in the various other components of the absorbent article described herein.)

The strainable web material is shown in FIGS. **6** and **7** in its substantially untensioned condition. The strainable web material has two centerlines, a longitudinal centerline, which is also referred to hereinafter as an axis or direction "l" and a transverse or lateral centerline, which is also referred to hereinafter as an axis or direction "t". The lateral centerline "t" is generally perpendicular to the longitudinal centerline "l". In a preferred embodiment, the longitudinal centerline **1** of the strainable web material is aligned with the longitudinal centerline **100** of the diaper **20**. In other embodiments, however, the longitudinal centerline **1** of the web material can be oriented in other directions, depending on the direction of extensibility desired.

As shown in FIGS. **6** and **7**, strainable web material **660** includes a "strainable network" of distinct and dissimilar regions. As used herein, the term "strainable network" refers to an interconnected and interrelated group of regions which are able to be extended to some useful degree in a predetermined direction providing the strainable web material with an elastic-like, relatively low resistive force stage and a relatively high resistive force stage. The strainable network includes at least a first region **664** and a second region **666**. The first region **664** has an elastic modulus E1 and a cross-sectional area A1. The second region **666** has a modulus E2 and a cross-sectional area A2. The first and second regions each have a first surface and an opposing second surface. In the preferred embodiment shown in FIGS. **6** and **7**, the strainable network includes a plurality of first regions **664** and a plurality of second regions **666**. The first regions **664** have a first axis **668** and a second axis **669**, wherein the first axis **668** is preferably longer than the second axis **669**. The first axis **668** of the first region **664** is substantially parallel to the longitudinal axis, l, of the strainable web material **660** while the second axis **669** is substantially parallel to the transverse axis, t, of the strainable web material **660**. The second regions **666** have a first axis **670** and a second axis **671**. The first axis **670** is substantially parallel to the longitudinal axis of the strainable web material, while the second axis **671** is substantially parallel to the transverse axis of the strainable web material. In the preferred embodiment of FIG. **6**, the first regions **664** and the second regions **666** are substantially linear, extending continuously in a direction substantially parallel to the longitudinal axis of the strainable web material.

In the illustrated embodiment, a portion of the strainable web material has been "formed" such that the entire strainable web material exhibits a controlled resistive force along a predetermined axis (which in the case of the illustrated embodiment is substantially parallel to the longitudinal axis of the web material) when subjected to an applied axial elongation in a direction substantially parallel to the longitudinal axis. As used herein, the term "formed" refers to the creation of a desired structure or geometry upon the web material that will substantially retain the desired structure or geometry when it is not subjected to any externally applied elongations or forces. Suitable methods for forming a material such as the strainable web material described herein include, but are not limited to embossing by mating plates or rolls, thermoforming, high pressure hydraulic forming, or casting.

The web material used in the present invention is comprised of a strainable network of contiguous, "distinct", and "dissimilar" regions, wherein the strainable network includes at least a first region and a second region, where the first region has a "surface-path length" less than that of the second region. The surface path length is measured parallel to a predetermined axis when the material is in an untensioned state. As used herein, the term "formed portion" refers to the portion of the material which is comprised of the desired structure or geometry of the strainable network. As used herein, the term "surface-path length" refers to a measurement along the topographic surface of the region in question in a direction parallel to the predetermined axis. As used herein, the term "distinct" or "dissimilar" when referring to regions, refers to regions within the strainable network having measurably different surface-path lengths as measured parallel to a predetermined axis while the web material is in an untensioned condition.

In a preferred embodiment shown in FIGS. **6** and **7**, the first regions **664** comprise a substantially planar region. That is, the material within the first region **664** is in substantially the same condition before and after the formation step undergone by strainable web material. The second regions **666** include a plurality of continuous, interconnected, deformations **674** which extend alternately beyond the plane of both the first and second surfaces (**664A** and **664B**, respectively) of first region **664**. In other embodiments, the deformations **674** may extend beyond the plane of only one of either the first or the second surfaces of the first region.

The deformations **674** have a first axis **676** which is substantially parallel to the transverse axis of the web material and a second axis **677** which is substantially parallel to the longitudinal axis of the strainable web material. The first axis **676** of the deformations **74** is at least equal to, and preferably longer than the second axis **677**. To enhance the two-stage resistive force versus elongation behavior characteristics of (the side flap) of the present invention, the ratio of the first axis **676** to the second axis **677** is at least 1:1, and preferably at least 2:1 or greater. In general, the greater this ratio, the more pronounced will be the two-stage resistive force versus elongation characteristic of the web material.

The first region **664** and the second region **666** each have a "projected path length". As used herein the term "projected path length" refers to length of a region as viewed perpendicularly to the surface of the web material measured parallel to the pre-determined axis (i.e., parallel to the longitudinal axis) of the strainable web material **660**. The projected path length of the first region **664** and the projected path length of the second region **666** are equal to one another.

However, as shown in FIG. **7**, the first region **664** has a surface-path length, L1, less than the surface-path length, L2, of the second region **666** as measured topographically parallel to the longitudinal axis of the web material while the web material is in an untensioned condition. To enhance the two-stage resistive force versus elongation behavior characteristic of the strainable web material **660**, the surface-path length of the second region **666** is at least about 15 percent greater than that of the first region, more preferably about 30 percent greater than that of the first region, and most preferably at least about 70 percent greater than that of the first region.

The web material **660** exhibits a modified "Poisson lateral contraction effect" substantially less than that of an otherwise identical unformed web material of the prior art. As used herein, the term "Poisson lateral contraction effect" describes the lateral contraction behavior of a material which is being subjected to an applied elongation. Preferably the Poisson lateral contraction effect of the web material of the present invention is less than about 0.4 when the web is subjected to about 20 percent elongation. Preferably, the web material exhibits a Poisson lateral contraction effect less than about 0.4 when the web material is subjected to about 40, 50, or even 60 percent elongation. More preferably, the Poisson lateral contraction effect is less than about 0.3 when the web material is subjected to 20, 40, 50, or 60 percent elongation.

For the strainable web material, the direction of applied axial elongation, indicated by arrows **680**, is substantially perpendicular to the first axis **676** of the deformations **674**. (The amount of axial elongation is distance, D.) As the deformations **674** are able to extend in a direction substantially perpendicular to their first axis **676**, the direction of applied axial elongation to cause extension in strainable web material is also substantially perpendicular to the first axis **676** of the deformations **674**.

While the direction of applied axial elongation, indicated by arrows **680**, is substantially perpendicular to the first axis **676** of the deformations **674**, an applied axial elongation having a longitudinal component will cause the strainable web material to extend in the direction of applied axial elongation.

In FIG. **10** there is shown an exemplary graph of a resistive force-elongation curve **720** of a formed polymeric web material of the present invention along with a similar curve **710** for a planar, base polymeric film from which the web material is formed. Referring now to the force-elongation curve **720**, there is an initial substantially linear, lower force versus elongation stage I designated **720***a*, a transition zone designated **720***b*, and a substantially linear stage II designated **720***c* which displays substantially higher force versus elongation behavior, corresponding to a resistive force wall beyond which the web material may undergo additional permanent deformation.

As seen in FIG. **10** a formed web material having a strainable network exhibits a controlled multi-stage behavior when subjected to an applied elongation in a direction parallel to the longitudinal axis of the web material. The resistive force to the applied elongation is significantly different between stage I (**720***a*) and stage II (**720***c*) of curve **720** as compared to curve **710** which does not exhibit this behavior. Referring now to FIG. **7**, as the web material is subjected to an applied axial elongation indicated by arrows **680** in FIG. **6**, the first region **664** having the shorter surface-path length, **L1**, provides most of the initial resistive force, **P1**, to the applied elongation which corresponds to stage I. While in stage I, the deformations **674** in the second region **666** are mostly out of the plane of applied elongation and offer minimal resistance to the applied elongation. In the transition zone between stages I and II, the deformations **674** are becoming aligned with the applied elongation. In stage II, as seen in FIG. **9**, the deformations **674** in the second region **666** have become substantially aligned with the plane of applied elongation and begin to resist further elongation. The second region **666** now contributes a second resistive force, **P2**, to further elongation. The first and second resistive forces to elongation provide a total resistive force, **PT**, which is greater than the resistive force provided by the first region **664**. Accordingly, the general slope of the force-elongation curve in stage II displays the characteristics of a force wall that is significantly greater than the general slope of the force-elongation curve in stage I.

The resistive force **P1** is substantially greater than the resistive force **P2** when (**L1**+**D**) is less than **L2**. While (**L1**+**D**) is less than **L2** the first region **664** provides an initial resistive force, **P1**, generally satisfying the equation:

$$P1=\frac{(A1*E1*D)}{L1}$$

When (**L1**+**D**) is greater than **L2** the first and second regions provide a combined total resistive force, **PT**, to the applied elongation **D**, generally satisfying the equation:

$$PT=\frac{(A1*E1*D)}{L1}+\frac{(A2*E2*|L1+D-L2|)}{L2}$$

(Where "*" represents a multiplication sign.)

The maximum elongation occurring while in stage I is considered to be the "available stretch" of the web material. The available stretch can be effectively determined by inspection of the force-elongation curve **720**, the approximate point at which there is an inflection in the transition zone between stage I and stage II is the percent elongation point of "available stretch". The range of available stretch can be varied from about 10% to 100% or more; this range of elastic-like response is often found to be of interest in disposable absorbent articles, and can be largely controlled by the extent to which surface-path length **L2** in the second region **666** exceeds surface-path length **L1** in the first region **64** and the properties of the base film. Significantly higher forces are required to achieve percent elongations in the base film equivalent to those percent elongations in the web **660**. The approximate extent of stage I can be controlled as desired by adjusting the path lengths, **L1** and **L2** in an untensioned condition. The force-elongation behavior of stage I can be controlled by adjusting the width, thickness, and spacing of first region **664** and the properties of the base film.

When the web material of FIG. **6** is subjected to an applied elongation, the web material exhibits an elastic-like behavior as it extends in the direction of applied elongation and retracts to its substantially untensioned condition once the applied force is removed, unless extended to the point of yielding. The web material is able to undergo multiple applications of applied elongation without losing its ability to substantially recover. Accordingly, the web material is able to retract to its substantially untensioned condition once the applied elongation or force is removed.

While the web material may be easily and reversibly extended in the direction of applied axial elongation, in a direction substantially perpendicular to the first axis **676** of the deformations **674**, web material is relatively non-extensible in a direction substantially parallel to the first axis **676** of the deformations **674**. The plastic deformation imparted upon the deformations **674** allows the deformations to be extended in one direction, in a direction substantially perpendicular to the first axis of the deformations, while being relatively non-extensible in a direction substantially perpendicular to the direction of extension, in a direction substantially parallel to the first axis of the deformations. In other embodiments, the strainable web material **660** can be provided with first regions **664** that extend outward from a center and second regions **666** that are disposed in concentric circles around the center to make the strainable web material **660** extensible in more than one direction.

The amount of applied force required to extend the web material is dependent upon the inherent properties of the base material forming the web material and the width and spacing of the undeformed regions **664**, with narrower and more widely spaced undeformed regions **664** requiring lower extensional forces to achieve the desired elongation. The first axis **668**, (i.e., the length) of the undeformed regions **664** is preferably greater than the second axis **669**, (i.e., the width) with a preferred length to width ratio of between 5:1 and 300:1.

The depth and number of deformations **674** can also be varied to control the applied force or elongation required to extend the web material of the present invention. In one preferred embodiment, the deformations are formed by two rigid plates having outer dimensions of 5.0" by 12" by 0.75". On one surface of each plate are a series of meshing teeth which are substantially triangular in cross section and measure 0.030" at their bases and taper to a vertex with a radius of 0.008" at the top. The centerlines of the teeth are spaced evenly and at 0.030" increments. On the "toothed" side of one plate, a series of grooves are cut which are parallel to each other and perpendicular to the evenly spaced teeth. These grooves measure 0.031" wide and are continuous over the entire length of the plate, and are spaced at a distance of 0.25" on center. These grooves correspond to the undeformed regions of the deformed web of material.

The preferred LLDPE base material is placed between the plates in a hydraulic press having platens larger than the plates to evenly distribute pressure. The plates are compressed under a load of at least 4,000 pounds. The formed web material is then removed from between the plates. The available stretch or elongation is increased if for a given number of deformations, the height or degree of deformation imparted on the deformations is increased. Similarly, the available stretch or elongation is increased if for a given height or degree of deformation, the number or frequency of deformations is increased.

The size of the backsheet **26** is dictated by the size of the absorbent core **28** and the exact diaper design selected. In a preferred embodiment, the backsheet **26** has a modified hourglass shape extending beyond the absorbent core a minimum distance of a bout 1.3 cm to about 2.5 cm (about 0.5 to about 1.0 inch) around the entire diaper periphery. Preferably, the backsheet **26** is much wider than the absorbent core in the rear waist region **44** so that the side panels **30** in the rear waist region **44** are generally wider in the lateral direction than the ear flaps **38** in the front waist region **46**.

The topsheet **24** is positioned adjacent the body-facing surface **56** of the absorbent core **28** and is preferably joined thereto and to the backsheet **26** by attachment means (not shown) such as those well known in the art. Suitable attachment means are described with respect to joining the backsheet **26** to the absorbent core **28**. In a preferred embodiment of the present invention, the topsheet **24** and the backsheet **26** are joined directly to each other in the diaper periphery and are indirectly joined together by directly joining them to the absorbent core **28** by the attachment means (not shown).

The topsheet **24** is compliant, soft feeling, and non-irritating to the wearer's skin. Further, the topsheet **24** is preferably liquid pervious permitting liquids (e.g., urine) to readily penetrate through its thickness. A suitable topsheet **24** may be manufactured from a wide range of materials, such as porous foams; reticulated foams; apertured plastic films; or woven or nonwoven webs of natural fibers (e.g., wood or cotton fibers), synthetic fibers (e.g., polyester or polypropylene fibers), or a combination of natural and synthetic fibers. The topsheet **24** is preferably made of a hydrophobic material to isolate the wearer's skin from liquids which have passed through the topsheet **24** and are contained in the absorbent core **28** (i.e. to prevent rewet). If the topsheet **24** is made of a hydrophobic material, at least the upper surface of the topsheet **24** is treated to be hydrophilic so that liquids will transfer through the topsheet more rapidly. This diminishes the likelihood that body exudates will flow off the topsheet **24** rather than being drawn through the topsheet **24** and being absorbed by the absorbent core **28**. The topsheet **24** can be rendered hydrophilic by treating it with a surfactant. Suitable methods for treating the topsheet **24** with a surfactant include spraying the topsheet **24** material with the surfactant and immersing the material into the surfactant. A more detailed discussion of such a treatment and hydrophilicity is contained in U.S. Pat. No. 4,988,344 entitled "Absorbent Articles with Multiple Layer Absorbent Layers" issued to Reising, et al on Jan. 29, 1991 and U.S. Pat. No. 4,988,345 entitled "Absorbent Articles with Rapid Acquiring Absorbent Cores" issued to Reising on Jan. 29, 1991, each of which is incorporated by reference herein.

In a preferred embodiment of the present invention, at least a portion of the topsheet **24** is subjected to mechanical stretching in order to provide a "zero strain" stretch laminate that forms the thigh panels **30** and **31**. The topsheet **24** can be prestrained by any methods as are known in the art including, but not limited to, the methods described herein with respect to the formation of the "zero strain" stretch backsheet. Thus, the topsheet **24** is preferably elongatable, more preferably drawable, but not necessarily elastomeric, so that the topsheet **24** will, upon mechanical stretching, be at least to a degree permanently elongated such that it will not fully return to its original configuration. In preferred embodiments, the topsheet **24** can be subjected to mechanical stretching without undue rupture or tearing. Thus, it is preferred that the topsheet **24** have a low cross-machine direction (lateral direction) yield strength.

There are a number of manufacturing techniques which may be used to manufacture the topsheet **24**. For example, the topsheet **24** may be a nonwoven web of fibers. When the topsheet **24** comprises a nonwoven web, the web may be spunbonded, carded, wetlaid, melt-blown, hydroentangled, combinations of the above, or the like. A suitable topsheet **24** is carded and thermally bonded by means well known to those skilled in the fabrics art. A satisfactory topsheet **24** comprises staple length polypropylene fibers having a denier of about 2.2 As used herein, the term "staple length fibers" refers to those fibers having a length of at least about 15.9 mm (0.625 inches). Preferably, the topsheet **24** has a basis weight from about 14 to about 25 grams per square meter. A suitable topsheet is manufactured by Veratec, Inc., a Division of International Paper Company, of Walpole, Mass. under the designation P-8.

The diaper **20** preferably further comprises elasticized leg cuffs **32** for providing improved containment of liquids and other body exudates. Each elasticized leg cuff **32** may comprise several different embodiments for reducing the leakage of body exudates in the leg regions. (The leg cuff can be and is sometimes also referred to as leg bands, side flaps, barrier cuffs, or elastic cuffs.) U.S. Pat. No. 3,860,003 describes a disposable diaper which provides a contractible leg opening having a side flap and one or more elastic members to provide an elasticized leg cuff(gasketing cuff). U.S. Pat. No. 4,909,803 entitled "Disposable Absorbent Article Having Elasticized Flaps" issued to Aziz et al. on Mar. 20, 1990, describes a disposable diaper having "stand-up" elasticized flaps (barrier cuffs) to improve the containment of the leg regions. U.S. Pat. No. 4,695,278 entitled "Absorbent Article Having Dual Cuffs" issued to Lawson on Sep. 22, 1987, describes a disposable diaper having dual cuffs including a gasketing cuff and a barrier cuff. U.S. Pat. No. 4,704,115 entitled "Disposable Waist Containment Garment" issued to Buell on Nov. 3, 1987, discloses a disposable diaper or incontinence garment having side-edge-leakage-guard gutters configured to contain free liquids within the garment. Each of these patents are incorporated herein by reference. While each elasticized leg cuff **32** may be configured so as to be similar to any of the leg bands, side flaps, barrier cuffs, or elastic cuffs described above, each elasticized leg cuff **32** preferably comprises a gasketing cuff as described in the above-referenced U.S. Pat. No. 3,860,003 and a barrier cuff as described in the above-referenced U.S. Pat. No. 4,909,803.

In a preferred embodiment of the present invention, the diaper **20** also comprises ear flaps **38** that extend laterally outwardly from each longitudinal edge **50** of the containment assembly **22** in the front waist region **46**. The ear flaps **38** provide a structure to which the rear waist region **44** can be attached when the diaper **20** is constructed in a conventional diaper configuration. Alternatively, the ear flaps **38** can provide a structure that is attached to the rear waist region **44** of the diaper **20** when the diaper **20** is constructed in a belted configuration. The ear flaps **38** may take on a number of different sizes, shapes, configurations, and materials. The ear flaps **38** may comprise a portion of the material making up one or more of the diaper elements, including the topsheet **24**, and the backsheet **26**. Alternatively, the ear flaps **38** may comprise a separate element or a plurality of elements affixed to the diaper. Suitable materials for use as the ear flaps **38** include woven webs; nonwoven webs; films, including polymeric films; foams; laminate materials including film laminates, nonwoven laminates, or zero strain laminates; formed films; elastomers; composites; structural elastic like-film (SELF) webs or any combination of materials hereinafter described or as described with respect to the extensible thigh panels **30** and **31** as are known in the art. The ear flaps **38** may be joined to the containment assembly **22** by any means as known in the art; for example the ear flaps **38** may be continuously or intermittently bonded to the containment assembly **22** using adhesive, heat bonding, pressure bonding, ultrasonic bonding, dynamic mechanical bonding or any other method that is known in the art.

The diaper **20** preferably further comprises an elastic waist feature **34** that helps provide improved fit and containment. The elastic waist feature **34** is that portion or zone of the diaper **20** which is intended to elastically expand and contract to dynamically fit the wearer's waist. The elastic waist feature **34** preferably extends longitudinally outwardly from at least one of the waist edges **60** of the absorbent core **28** and generally forms at least a portion of the end edge **52** of the diaper **20**. Disposable diapers are generally constructed so as to have two elastic waist features, one positioned in the rear waist region **44** and one positioned in the front waist region **46**, although diapers can be constructed with a single elastic waist feature. Further, while the elastic waist feature **34** or any of its constituent elements can comprise a separate element affixed to the diaper **20**, the elastic waist feature **34** may be constructed as an extension of other elements of the diaper such as the backsheet **26** or the topsheet **24**, preferably both the backsheet **26** and the topsheet **24**.

The elastic waist feature **34** may comprise any suitable stretchable or elastomeric materials. (As used herein, the term "stretchable" refers to materials that are extensible when forces are applied to the material, and offer some resistance to extension. The term "elastomeric" refers to materials that extend in at least one direction when a force is applied to the material, and return to approximately their original dimensions after the force is released.) Suitable elastomeric materials for use as the elastic waist feature **34** are described hereinbelow with respect to the extensible side panels **30**.

The elastic waist feature **34** may be constructed in a number of different configurations including those described in U.S. Pat. No. 4,515,595 entitled "Disposable Diapers with Elastically Contractible Waistbands" issued to Kievit et al. on May 7, 1985 and the above referenced U.S. Pat. No. 5,151,092 issued to Buell; each of these references being incorporated herein by reference. Further, the elastic waist feature **34** may comprise "pleats" that may be activated by the diaperer to provide additional extension in the waist regions. (As used herein, the term "pleats" refers to regions of material that have been folded back upon themselves such that when an activation force is applied the material unfolds.) This additional extension provided by this pleated configuration is desirable when the diaper **20** is fitted to the wearer in either the conventional or the belted configuration and removed by pulling the diaper off the wearer without detaching the fastening system.

In a particularly preferred embodiment of the present invention, the diaper **20** additionally comprises two thigh panels, such as a first thigh panel **30** and a second thigh panel **31**, as shown in FIG. **1**. When the diaper **20** is fitted to the wearer, the thigh panels **30** and **31** cover the buttocks of the wearer and encircle the outer portion of the wearer's legs. The thigh panels **30** and **31** extend laterally outwardly from, and are disposed along the longitudinal edges **50** of the containment assembly **22** in the crotch region **48**. (The term "disposed" as used herein means that an element(s) of the diaper is formed (joined and positioned) in a particular place or position as a unitary structure with other elements of the diaper or a separate element joined to another element of the diaper.) As shown in FIG. **1**, the first thigh panel **30** is joined to the first belt flap **62** and extends generally longitudinally from the first belt flap **62** along one of the longitudinal edges **50** of the containment assembly **22** to a location in the crotch region **48**. Likewise, the second thigh panel **31** is joined to the second belt flap **64** and extends generally longitudinally from the second belt flap **64** to a location adjacent the other longitudinal edge **50** of the containment assembly **22** in the crotch region **48**.

The thigh panels **30** and **31** may take on a number of different sizes, shapes, materials and configurations. In a preferred embodiment, the thigh panels are extensions of the topsheet **24**, the backsheet **26**, or both. However, the thigh panels may comprise separate elements that are joined to the diaper **20**. Examples of materials suitable for use in the thigh panels are hereinbefore described with respect to the topsheet **24** and the backsheet **26**. In an especially preferred embodiment, at least a portion of the material forming the thigh panels is subjected to mechanical stretching in order to provide a "zero strain" stretch laminate extensible in at least the lateral direction. This allows the thigh panels to expand in conjunction with the motions of the wearer and reduces the possibility of red marks in the regions where the thigh panels contact the wearer. Examples of suitable methods for prestraining the material forming the thigh panels are described herein with respect to the topsheet and the backsheet and the above referenced U.S. Pat. No. 5,151,092 issued to Buell, et al. which is incorporated herein by reference. The thigh panels **30** and **31** may be joined to the diaper **20** by any means as known in the art; for example the thigh panels may be continuously or intermittently bonded to the containment assembly **22** using adhesive, heat bonding, pressure bonding, ultrasonic bonding, dynamic mechanical bonding or any other method that is known in the art.

The diaper **20** additionally comprises a pair of belt flaps such as a first belt flap **62** and a second belt flap **64**, as shown in FIG. **1**. The belt flaps **62** and **64** encircle part of the waist of the wearer when the diaper **20** is fitted to the wearer. When the diaper is fitted to the wearer in the conventional configuration, the belt flaps **62** and **64** extend from the rear waist region **44** of the diaper **20** around the wearer's hips to the front waist region **46** of the diaper where the belt flaps **62** and **64** are fastened to the front waist region **46** forming the diaper's waist closure. In the belted configuration, the belt flaps **62** and **64** extend from the rear waist region **44** of the diaper **20** around the wearer's hips where the belt flaps **62** and **64** are fastened together to form a belt.

Each belt flap is preferably disposed adjacent one of the longitudinal edges **50** of the containment assembly **22**, preferably in the rear waist region **44**. While it is not necessary that the pair of belt flaps be identical, as shown in FIG. **1**, they are preferably mirror images of one another. Each of the belt flaps **62** and **64** have a proximal edge, a distal edge, an end edge, an inner surface, and an outer surface. For example, the first belt flap **62** has a proximal edge **66** disposed adjacent one of the longitudinal edges **50** of the containment assembly **22** in the rear waist region **44** of the diaper **20**, a distal edge **68** spaced laterally outwardly from the proximal edge **66**, and an end edge **63** running between the proximal edge **66** and the distal edge **68**. The second belt flap **64** has a proximal edge **70**, a distal edge **72** and an end edge **65**. As shown in FIG. **1**, the end edges **63** and **65** of the belt flaps **62** and **64** can form a portion of the end edge **52** of the diaper **20**, however, embodiments are contemplated wherein the end edges **63** and **65** do not form a portion of the end edge **52** of the diaper **20**. The inner surface of each belt flap is designated **67** and the outer surface of each belt flap is designated **69**. As shown in FIG. **1**, the outer surface **69** of each belt flap is that surface which faces away from the wearer when the diaper is being worn and generally corresponds to the outer surface **40** of the containment assembly **22**. As shown in FIG. **2**, the inner surface **67** of each belt flap is that surface which faces the wearer when the diaper **20** is being worn and generally corresponds to the inner surface **42** of the containment assembly.

In a preferred embodiment of the present invention, the belt flaps **62** and **64** are at least partially elastically extensible in the lateral direction to provide a more comfortable and contouring fit. (As used herein, the term "elastically extensible" refers to materials that extend in at least one direction when a force is applied and return to approximately their original dimensions after the force is removed. The "lateral direction" is defined as the direction parallel to the transverse centerline **102** of the diaper.) Elastically extensible belt flaps also provide more effective application of the diaper since even if the diaperer fits the diaper to the wearer asymmetrically, the diaper will self adjust during wear to attain an improved fit. Further, elastically extensible belt flaps provide improved dynamic fit about the waist of the wearer, reducing the possibility of sagging or gapping, and sustaining the fit of the diaper throughout the time of wear.

The belt flaps **62** and **64** may take on a number of different sizes, shapes, configurations and materials. The exact length, width and thickness of the belt flaps **62** and **64** will vary depending on the dimensions of the intended user. It is important, however, that the belt flaps **62** and **64** be long enough in the lateral direction to completely encircle the waist of the wearer to ensure that the diaper can be properly fitted to the wearer in the belted configuration. (In embodiments comprising elastically extensible belt flaps, the dimensions of the belt flaps are preferably taken while the belt flaps are under some tension rather than when the belt flaps are in their relaxed condition. This ensures that the belt flaps will provide the diaper **20** with the advantages discussed above.) The belt flaps **62** and **64** may comprise a portion of the material making up one or more of the diaper elements, including the topsheet **24**, the backsheet **26**, or the waist feature **34**. Alternatively, the belt flaps may comprise a separate element or a plurality of elements joined to the diaper **20**. If the belt flaps **62** and **64** are separate elements joined to the diaper **20**, they can be joined by any by any means as known in the art. Examples of suitable attachment means include adhesive bonding, heat bonding, pressure bonding, ultrasonic bonding, dynamic mechanical bonding or a combination of any of these means or any other means as are known in the art.

One elastically extensible material that has been found to be especially suitable for use in the belt flaps is a laminate of two coverstock layers with an elastomeric synthetic rubber foam sandwiched between the coverstock layers. (As used herein, the term "coverstock" refers to any woven or nonwoven materials.) An example of suitable coverstock material is hereinbefore discussed with respect to the topsheet **24** and the backsheet **26**. Examples of suitable synthetic foams to be sandwiched between the coverstock layers include: a) crosslinked natural rubber foams preferably having a caliper of approximately 50 mils and a density of approximately 13.3 pounds per cubic foot (0.214 grams per cubic cm), such as is available from Fulflex Inc., of Middletown, R.I., or as available from Ludlow Composites Corporation of Freemont, Ohio and marketed under the tradename Baby Foam; or b) polyurethane foams having a caliper of approximately 80 mils and a density of approximately 2.06 pounds per cubic foot (0.033 grams per cubic cm), such as is available from Bridgestone of Yokohama, Japan and marketed under the tradename Bridgestone SG Polyurethane Foam. Other suitable materials for use as or in the belt flaps include structural elastic-like film (SELF) webs, as described above, natural rubber, natural rubber foams, elastomeric scrims, woven or nonwoven elastomeric webs, elastomeric composites such as elastomeric nonwoven laminates, zero strain stretch laminates, prestrained stretch laminates or the like. The above referenced U.S. Pat. No. 5,151,092 issued to Buell et al., on Sep. 29, 1992, describes suitable zero strain stretch laminates and prestrained stretch laminates, and is herein incorporated by reference.

The diaper **20** additionally comprises a fastening system comprising a first fastening assembly and a second fastening assembly. The fastening system permits the user to construct and fit the diaper **20** to the wearer in at least two different configurations (i.e., the diaper is convertible). The first fastening assembly is designed to fasten the diaper **20** in a belted configuration. As used herein, the term "belted configuration" refers to a diaper that is fitted to the wearer by first constructing a belt about the waist of the wearer and then completing the application by forming a closure between the front and rear portions of the diaper. (The term "belt" means any element or elements of the diaper that fasten together to completely encircle the waist of the wearer prior to forming the closure between the front and rear portions of the diaper.) The second fastening assembly is designed to fasten the diaper **20** in a conventional configuration. The term "conventional configuration" refers to a diaper that is fitted to the wearer without the construction of a belt as described above. As shown in FIG. **5**, a preferred embodiment of the present invention constructed in the conventional configuration is fitted to the wearer by placing the rear waist region **44** of the diaper **20** under the back of the wearer, pulling the front waist region **46** through the legs of the wearer to the wearer's waist and fastening the front waist region **46** to the waist region **44** to form side closures and to complete construction of the diaper **20**.

In preferred embodiments of the present invention, the fastening system is designed such that the soft, non-irritating elements of the diaper and the fastening assemblies will come in contact with the wearer's skin. Further, the fastening assemblies are preferably integrated to reduce the number of fastening elements needed to achieve the convertible diaper design. (As used herein, the term "integrated" refers to the coordination of the fastening assemblies such that one or more of the individual fastening elements used in the first fastening assembly is also used in the second fastening assembly.) This integration reduces the cost of the material needed in the fastening system thus reducing the overall manufacturing cost of the diaper **20**.

The fastening system can comprise any attachment means known in the art including pressure sensitive adhesives, cohesive materials, mechanical fasteners, such as hook and loop type fasteners, or any combination of these or any other attachment means known in the art. Exemplary adhesive tape tab fastening systems are disclosed in U.S. Pat. No. 3,848,594 entitled "Tape Fastening System for Disposable

Diaper" issued to Buell on Nov. 19, 1974; and U.S. Pat. No. 4,662,875 entitled "Absorbent Article" issued to Hirotsu and Robertson on May 5, 1987. Exemplary fastening systems comprising mechanical fastening components are described in U.S. Pat. No. 5,058,247 entitled "Mechanical Fastening Prong" issued to Thomas on Oct. 22, 1991; U.S. Pat. No. 4,869,724 entitled "Mechanical Fastening Systems With Adhesive Tape Disposal Means For Disposal of Absorbent Articles" issued to Scripps on Sep. 26, 1989; and U.S. Pat. No. 4,848,815 entitled "Disposable Diaper Having an Improved Fastening Device" issued to Scripps on Jul. 11, 1989. An example of a fastening system having combination mechanical/adhesive fasteners is described in U.S. Pat. No. 4,946,527 entitled "Pressure-Sensitive Adhesive Fastener and Method of Making Same" issued to Battrell on Aug. 7, 1990. Each of these patents are incorporated herein by reference.

In a preferred embodiment of the present invention, the fastening system comprises hook and loop type fasteners. As used herein, the term "hook and loop type fasteners" refers to fastening means comprising a "hook" component (hereinafter refered to as an "engaging component") and a complementary loop component (hereinafter refered to as a "landing component"). The term "hook" is used to designate a material having engaging elements. Thus, the hook fastening material may also be referred to as a male fastener. It should also be understood that the use of the term "hook" should be non-limiting in the sense that the engaging elements may comprise any shapes as are known in the art so long as they are adapted to engage a complementary landing component.

One embodiment of the present invention comprises a hook fastening material preferably comprising a base and a plurality of engaging elements extending from the base. The hook fastening material is intended to engage fibrous elements of a loop fastening material so as to provide a secure fastening device. Thus, the hook fastening material may be manufactured from a wide range of materials. Suitable materials include nylon, polyester, polypropylene, or any combination of these materials. A suitable hook fastening material comprises a number of shaped engaging elements projecting from a woven backing such as the commercially available material designated "SCOTCHMATE" brand No. FJ3402 available from Minnesota Mining and Manufacturing Company, St. Paul, Minn. Alternatively, the engaging elements may have any shape such as hooks, "T's" or any other shape as are well known in the art. A particularly preferred hook fastening material is described in U.S. Pat. No. 5,058,247 entitled "Mechanical Fastening Prong" issued to Thomas Oct. 22, 1991 which is incorporated herein by reference.

The landing component preferably comprises a fastening element engageable with the hook component. Thus, the landing component may be manufactured from a wide range of materials and configurations capable of securely engaging the hook component. For example, the landing component may comprise identical complementary elements or distinct complementary elements. As used herein, the term "identical complementary elements" is used to define mechanical fastening systems wherein the engaging elements of the hook component and the landing component comprise the same configuration or structure that are interlocking. Examples of such systems are described in Brown et al. U.S. Pat. No. 4,322,875 entitled "Two Strip Materials Used For Forming Fasteners" issued on Apr. 16, 1982 and Kellenberger et al. U.S. Pat. No. 4,701,179 entitled "Fixed Position Fasteners For Disposable Absorbent Garments" issued on Oct. 20, 1987. The term "distinct complementary elements" is used herein to designate a system wherein the hook component is different from the landing component but is engageable therewith.

In one preferred embodiment, the landing component comprises a plurality of fiber elements, such as a loop fastening material, that engage the engaging elements of the hook component. The loop fastening material may be manufactured from a wide range of materials to provide fiber elements, preferably loops. Suitable materials include nylon, polyester, polypropylene, or any combination of these materials. A suitable loop fastening material comprises a number of fiber loops projecting from a woven backing such as the commercially available material designated "SCOTCHMATE" brand nylon woven loop No. SJ3401 available from Minnesota Mining and Manufacturing Company, St. Paul, Minn. A preferred loop fastening material comprises a tricot knit fabric having a plurality of nylon filament loops projecting from a backing of nylon such as the commercially available material designated "Guilford No. 16110" available from Guilford Mills of Greensboro, N.C. Alternatively, the loop fastening material may be a non-woven fabric or any other type of fiber material or loop material which are well known in the art. An inexpensive loop fastening material and a method of making the same is described in U.S. Pat. No. 5,032,122, entitled "Loop Fastening Material For Fastening Device and Method of Making Same" issued to Noel et al., Jul. 16, 1991, which application is incorporated herein by reference.

The fastening elements may be disposed on either the outer surface or the inner surface of the diaper **20**. In a preferred embodiment, however, the fastening elements are disposed on the diaper **20** such that the fasteners do not irritate the wearer's skin. Accordingly, the fasteners disposed on inner surfaces of the diaper **20** that come in contact with the wearer's skin should be soft and non-irritating. In addition, the fastening elements may either be a discrete separate element affixed to the diaper **20** or a unitary piece of material that is neither divided nor discontinuous with an element of the diaper **20** such as the topsheet **24** or the backsheet **26**. While the fastening elements can assume varying sizes and shapes, they preferably comprise one or more separate patches of material joined to the diaper **20** to allow for a maximum fit adjustment at the waist of the wearer.

As shown in FIGS. **1** and **2**, the first fastening assembly of the present invention comprises a first belt flap closure member **74**, a second belt flap closure member **76**, a rear waist region closure member **78** and a second front waist region closure member **80**. The first belt flap closure member **74** preferably comprises an engaging component and is preferably disposed adjacent the first belt flap's distal edge **68** on the outer surface **69** such that the fastening surface faces away from the wearer. (As used herein, the term "fastening surface" refers to the surface of a fastening element that is engageable with the fastening surface of another fastening element or any other surface of any element of the diaper.) The first belt flap closure member **74** may either be a discrete separate element affixed to the diaper **20** or a unitary piece of material that is neither divided nor discontinuous with an element of the diaper **20**. When constructing the diaper **20** in the belted configuration, the first belt flap closure member **74** is engaged with the second belt flap closure member **76** to form a belt about the waist of the wearer.

The second belt flap closure member **76** preferably comprises a landing component and is preferably disposed adjacent the second belt flap's distal edge **72**, on the inner surface **67** such that the fastening surface faces the wearer. The second belt flap closure member **76** may either be a discrete separate element affixed to the diaper **20** or a unitary piece of material that is neither divided nor discontinuous with an element of the diaper **20** such as the topsheet **24**. When constructing the diaper **20** in the belted configuration, the second flap closure member **76** is engaged with the first belt flap closure member **74** to form a belt about the waist of the wearer. When the diaper **20** is constructed in the conventional configuration, the second belt flap closure member **76** engages the third closure member **84** to fasten the rear waist region **44** to the front waist region **46**.

The rear waist region closure member **78** preferably comprises an engaging component and is preferably disposed on the outer surface **69** of the rear waist region such that the fastening surface faces away from the wearer. The rear waist closure member **78** may either be a discrete separate element affixed to the diaper **20** or a unitary piece of material that is neither divided nor discontinuous with the elements of the diaper **20** forming the rear waist region **44** of the diaper **20**, such as the backsheet **26**. Further, the rear waist closure member **78** can assume varying sizes and shapes, preferably one or more separate patches of material joined to the diaper **20** to allow for a maximum fit adjustment at the waist of the wearer. When the diaper **20** is constructed in the belted configuration, the front waist region closure member **80** engages the rear waist region closure members **78** to secure the front waist region **46** of the diaper **20** to the rear waist region **44**.

The front waist region closure member **80** preferably comprises at least one landing component disposed adjacent each longitudinal edge **50** of the containment assembly **22** in the front waist region **46**. In embodiments of the present invention comprising ear flaps **38**, the front waist region closure member **80** comprises at least one closure member disposed on each of the ear flaps **38**, preferably laterally outboard from the longitudinal edges **50** of the containment assembly. The front waist region closure member **80** is preferably a discrete separate element disposed on the outer surface **40** of the diaper **20** such that the fastening surface faces the wearer. However, embodiments are contemplated wherein the front waist region closure member **80** is unitary with the ear flaps **38** or other elements of the diaper **20**, such as the topsheet **24**. Further, the front waist region closure member **80** may be disposed on the inner surface **42** of the diaper such that the fastening surface faces the wearer. When the diaper is constructed in the belted configuration, the front waist region closure members **80** engages the rear waist region closure members **78** to secure the front waist region **46** of the diaper **20** to the rear waist region **44**. In the conventional configuration, however, at least a portion of each front waist region closure member **80** is positioned against the wearer's skin. Therefore, it is important that the portion of the front waist region closure members **80** that will come in contact with the wearer's skin comprise a soft, non-irritating material.

As shown in FIGS. 1 and 2, the second fastening assembly comprises a first closure member **82**, the second belt flap closure member **76** of the first fastening assembly, and a third closure member **84**. The first closure member **82** preferably comprises a landing component and is preferably disposed adjacent the first belt flap's distal edge **68**, on the inner surface **67** such that the fastening surface faces the wearer. The first closure member **82** may either be a discrete separate element affixed to the diaper **20** or a unitary piece of material that is neither divided nor discontinuous with an element of the diaper **20** such as the topsheet **24**. When the diaper **20** is constructed in the conventional configuration, the first closure member **82** engages the third closure member **84** to secure the rear waist region **44** of the diaper **20** to the front waist region **46**. However, when the diaper **20** is constructed in the belted configuration, at least a portion of the first closure member **82** contacts the skin of the wearer. Therefore, it is important that the portion of the first closure members **82** that will come in contact with the wearer's skin comprise a soft, non-irritationg material.

The second belt flap closure member **76** preferably comprises a landing component and is preferably disposed adjacent the second belt flap's distal edge **72**, on the inner surface **67** such that the fastening surface faces the wearer. (The second belt flap closure member **76** is described in more detail above with respect to the first fastening assembly).

The third closure member **84** preferably comprises an engaging component and is preferably disposed adjacent the end edge **52** of the diaper **20**, in the front waist region **46**. The third closure member is preferably disposed on the outer surface **40** of the diaper **20** such that the fastening surface faces away from the wearer. The third closure member **84** may comprise either a discrete separate element affixed to the diaper **20** or a unitary piece of material that is neither divided nor discontinuous with an element of the diaper **20** such as the backsheet **26**. Further, the third closure member **84** can assume varying sizes and shapes, they preferably comprises one or more separate patches of material joined to the diaper **20** to allow for a maximum fit adjustment at the waist of the wearer. When the diaper **20** is constructed in the conventional configuration, the third closure member **84** engages the first closure member **82** and the second belt flap closure member **76** to secure the front waist region **46** of the diaper **20** to the rear waist region **44**.

In a preferred embodiment, the present invention provides the diaperer with at least three options as to how the diaper may be constructed and fit to the wearer. If the diaperer prefers to use the belted diaper configuration, the diaper **20** is preferably constructed and applied to the wearer using the first fastening assembly. Preferably, the diaper is first positioned such that the rear waist region **44** is behind the hips of the wearer with the from waist region **46** extends toward the wearer's legs. This positions the diaper **20** such that first belt flap **62** and the second belt flap **64** can be fastened together to form a belt about the waist of the wearer. To construct the belt, the diaperer engages the first belt flap closure member **74** disposed on the outer surface **69** of the first belt flap **62** with the second belt flap closure member **76** disposed on the inner surface **67** of the second belt flap **64**. The diaperer then pulls the front waist region **46** of the diaper **20** through the wearer's legs and up to the wearer's waist. Once in this position, the front waist region **46** of the diaper **20** can be fastened to the rear waist region **44** of the diaper **20**. The side closures are formed by engaging the front waist region fastening members **80**, disposed on the inner surface **42** of the front waist region **46** adjacent each longitudinal edge **50** of the containment assembly **22**, with the rear waist region closure member **78** disposed on the outer surface **40** of the containment assembly **22** in the rear waist region **44**.

If the diaperer wishes to use the diaper in the conventional configuration, the second fastening assembly is used. The diaper **20** is preferably applied to the wearer in the conventional configuration by first positioning one of the waist regions, preferably the rear waist region **44**, under the wearer's back. The remainder of the diaper **20** is then drawn between the wearer's legs such that the other waist region, preferably the front waist region **46**, is positioned across the front of the wearer. The diaperer then grasps the first belt flap **62** or the second belt flap **64**, or both and wraps them around the waist of the wearer. The diaperer then engages the first closure member **82** disposed on the inner surface **67** of the first belt flap **62** and the second belt flap closure member **76** disposed on the inner surface **67** of the second belt flap **64** with the third closure member **84** disposed on the outer surface **40** of the containment assembly **22** in the front waist region **46**. This forms a waist closure on each side of the wearer and completes the construction of the conventional diaper using the second fastening assembly.

In a particularly preferred embodiment of the present invention, the diaper can be used as a pant. For example, the diaper can be constructed in either the conventional or the belted configuration to form a pant before fitting the diaper to the wearer. The diaperer or wearer then pulls the diaper up and over the wearer's hips where it is held in place around the wearer's waist by the inward forces provided by the elastic waist feature. In this configuration, the diaper can be removed by pulling the diaper down and off the wearer without releasing the fastening system, or by releasing the fastening system and removing the diaper from around the wearer's waist. Alternatively, the diaper can be constructed and fit to the wearer as herein described with respect to the conventional or the belted diaper configurations and be removed by pulling the diaper down over the wearer's hips and off the wearer without releasing the fastening system. Accordingly, the diaperer is provided with additional options as to how the diaper will be fitted to and/or removed from the wearer. This type of diaper is particularly attractive as a training pant because it combines the feel of a pant with the advantages discussed herein with respect to ease of inspection for soiling and removal by releasing the fastening system.

While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

What is claimed is:

1. A disposable absorbent article having a refastenable fastening system allowing the absorbent article to be fitted to a wearer in a belted configuration or in a conventional configuration, the absorbent article comprising:

a) a containment assembly having a rear waist region, a crotch section, a front waist region, a pair of longitudinal edges, an inner surface and an outer surface opposite of said inner surface, said containment assembly comprising a liquid pervious topsheet, a liquid impervious backsheet joined to said topsheet, and an absorbent core positioned between said topsheet and said backsheet;

b) a first belt flap extending laterally outwardly from one of said longitudinal edges of said containment assembly in said rear waist region, said first belt flap having a proximal edge joined to said rear waist region, a distal edge spaced laterally outwardly from said proximal edge, an inner surface, and an outer surface;

c) a second belt flap extending laterally outwardly from the other of said longitudinal edges of said containment assembly in said rear waist region, said second belt flap having a proximal edge joined to said rear waist region, a distal edge spaced laterally outwardly from said proximal edge, an inner surface, and an outer surface;

d) a first fastening assembly for fastening said absorbent article in a belted configuration comprising:

i) a first belt flap closure member disposed adjacent said distal edge on said first belt flap on said outer surface;

ii) a second belt flap closure member disposed adjacent said distal edge on said second belt flap on said inner surface, said second belt flap closure member being engageable with said first belt flap closure member to form a belt;

iii) a rear waist region closure member disposed on said outer surface on said containment assembly in said rear waist region; and

iv) a front waist region closure member disposed adjacent each said longitudinal edge of said containment assembly in said front waist region on said inner surface; said front waist region closure member being engageable with said rear waist region closure member; and

e) a second fastening assembly for fastening said absorbent article in a conventional configuration comprising:

i) a first closure member disposed adjacent said distal edge on said first belt flap on said inner surface,

ii) said second belt flap closure member disposed adjacent said inner surface on said second belt flap adjacent said distal edge of said second belt flap, and

iii) a third closure member disposed adjacent the end edge of said front waist region on said outer surface of said containment assembly, said third closure member being engageable with said second belt flap closure member component and said first closure member.

2. The absorbent article of claim **1** wherein said first fastening assembly comprises mechanical fasteners.

3. The absorbent article of claim **1** wherein said second fastening assembly comprises mechanical fasteners.

4. The absorbent article of claim **1** wherein said first fastening assembly and said second fastening assembly each comprise mechanical fasteners.

5. The absorbent article of claim **4** wherein said front waist region closure member, said first closure member and said second belt flap closure member comprise a landing component.

6. The absorbent article of claim **5** wherein said landing component comprises a loop component of a hook and loop fastener.

7. The absorbent article of claim **6** wherein said first belt flap closure member, said rear waist region closure member, and said third closure member comprise an engaging component.

8. The absorbent article of claim **7** wherein said engaging component comprises a hook component of a hook and loop fastener.

9. The absorbent article of claim **8** wherein said belt flaps are elastically extensible.

10. The absorbent article of claim **9** wherein said first and second belt flaps are unitary with said containment assembly.

11. The absorbent article of claim **9** wherein said first and second belt flaps are separate elements joined to said containment assembly.

12. The absorbent article of claim **1** wherein said first fastening assembly comprises adhesive fasteners.

13. The absorbent article of claim **1** wherein said second fastening assembly comprises adhesive fasteners.

14. The absorbent article of claim **1** wherein said first fastening assembly and said second fastening assembly comprise adhesive fasteners.

15. The absorbent article of claim **1** wherein said rear waist region closure member comprises a pair of fastening elements disposed on laterally opposing sides of the containment assembly.

* * * * *

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(54) FLEXIBLE MECHANICAL FASTENING TAB

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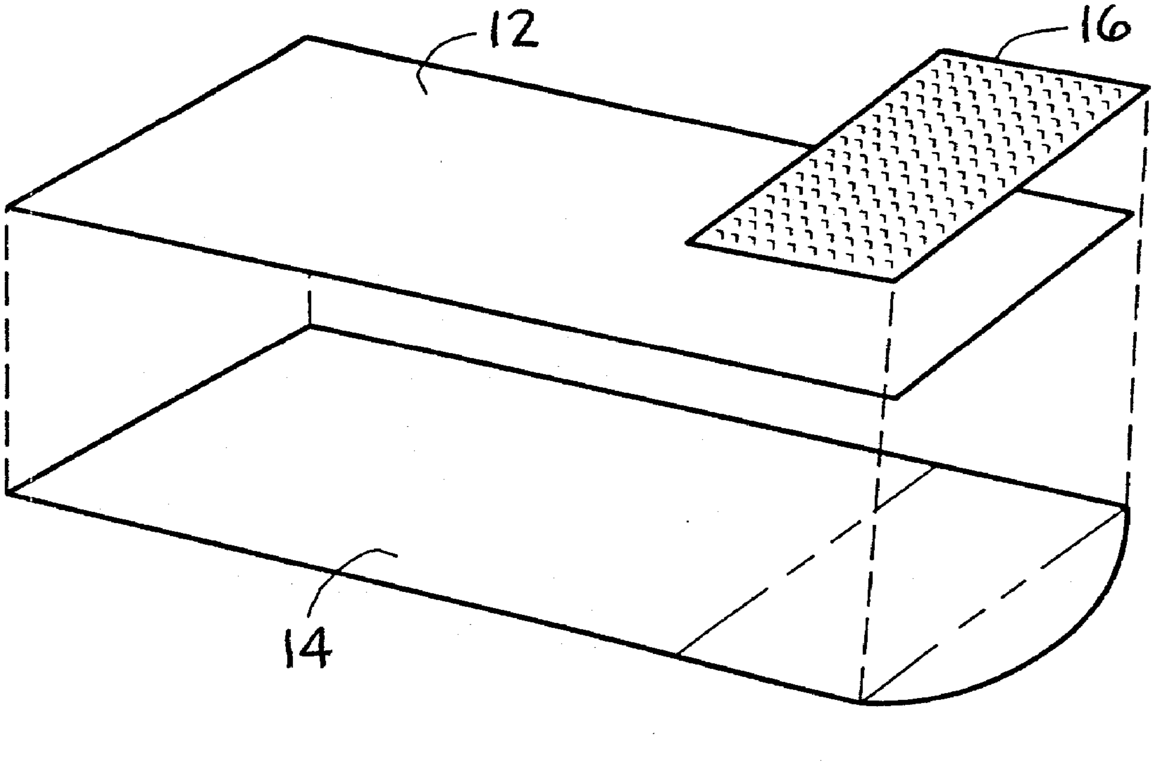
(52) **U.S. Cl.** **604/386**

(57) ABSTRACT

Disclosed is a mechanical fastening tab formed from a substrate adapted to be joined to a disposable absorbent product and a first mechanical fastener component. The fastening tab has a Gurley stiffness value of less than about 1000 milligrams in an area of the fastening tab which includes said first mechanical fastening component. Also disclosed are disposable products comprising such mechanical fastening tabs.



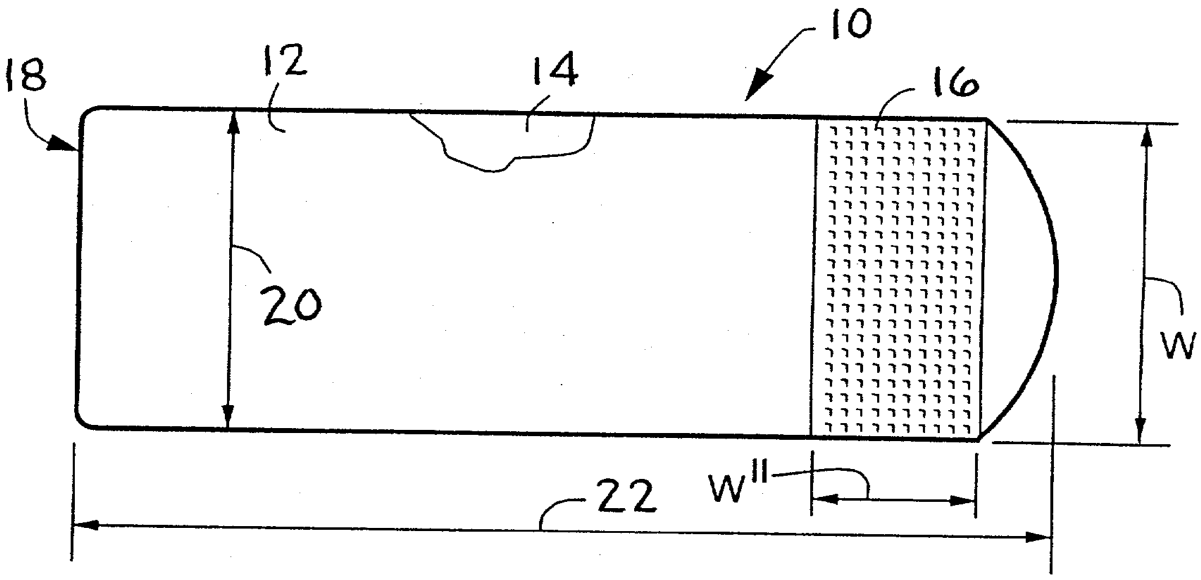


FIG. 1

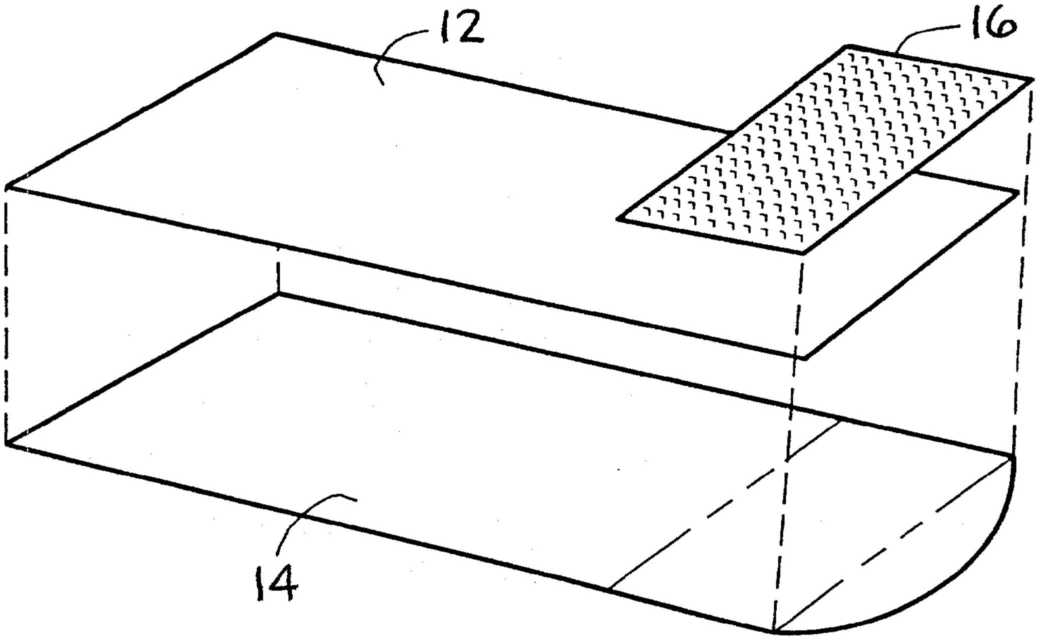


FIG. 2

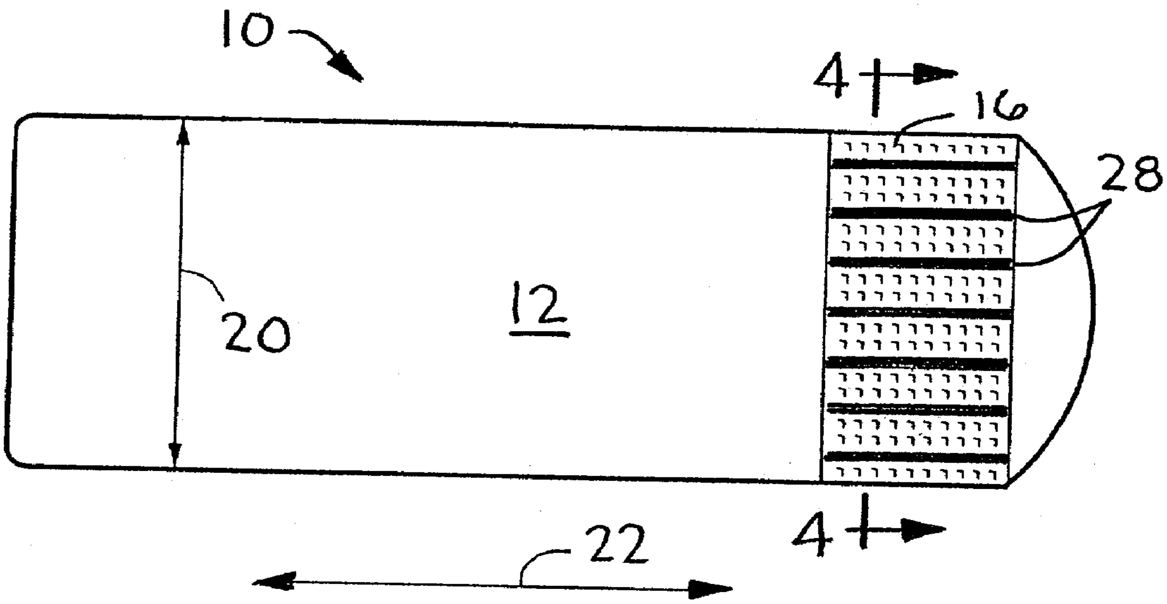


FIG. 3

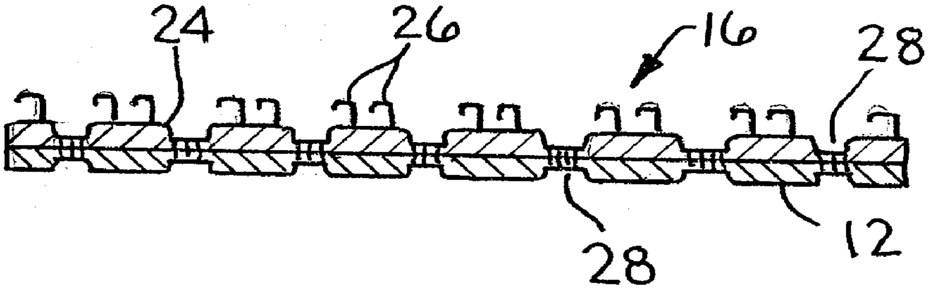


FIG. 4

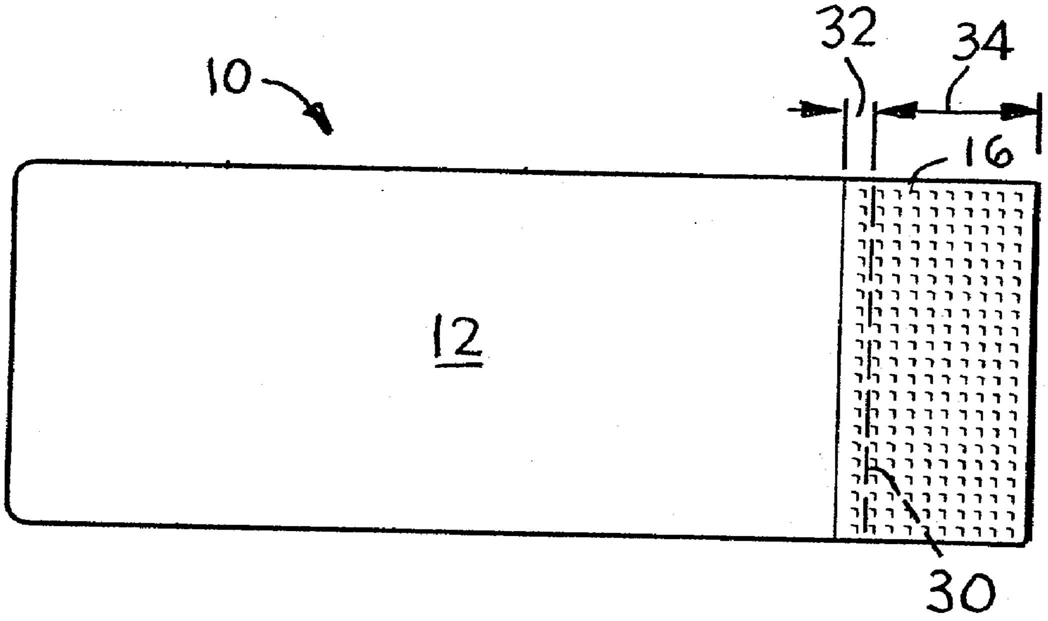


FIG. 5

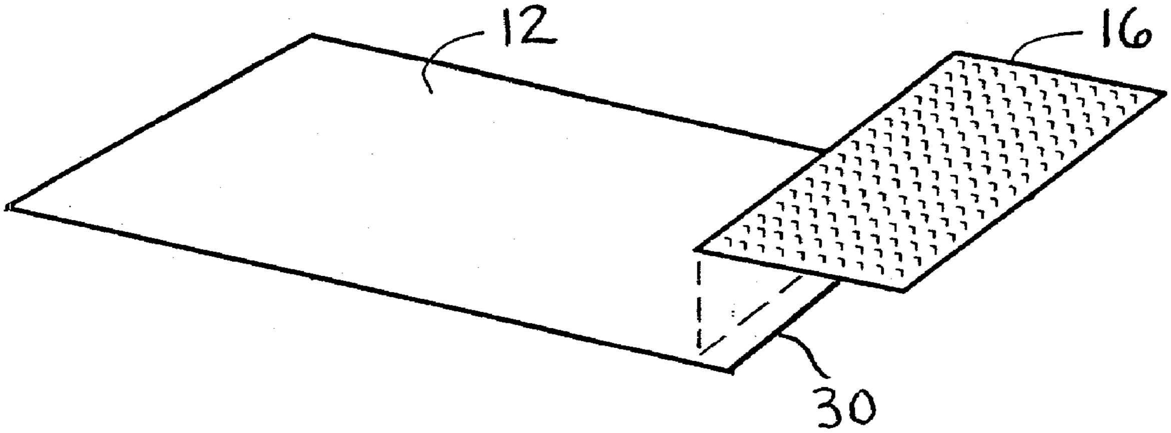


FIG. 6

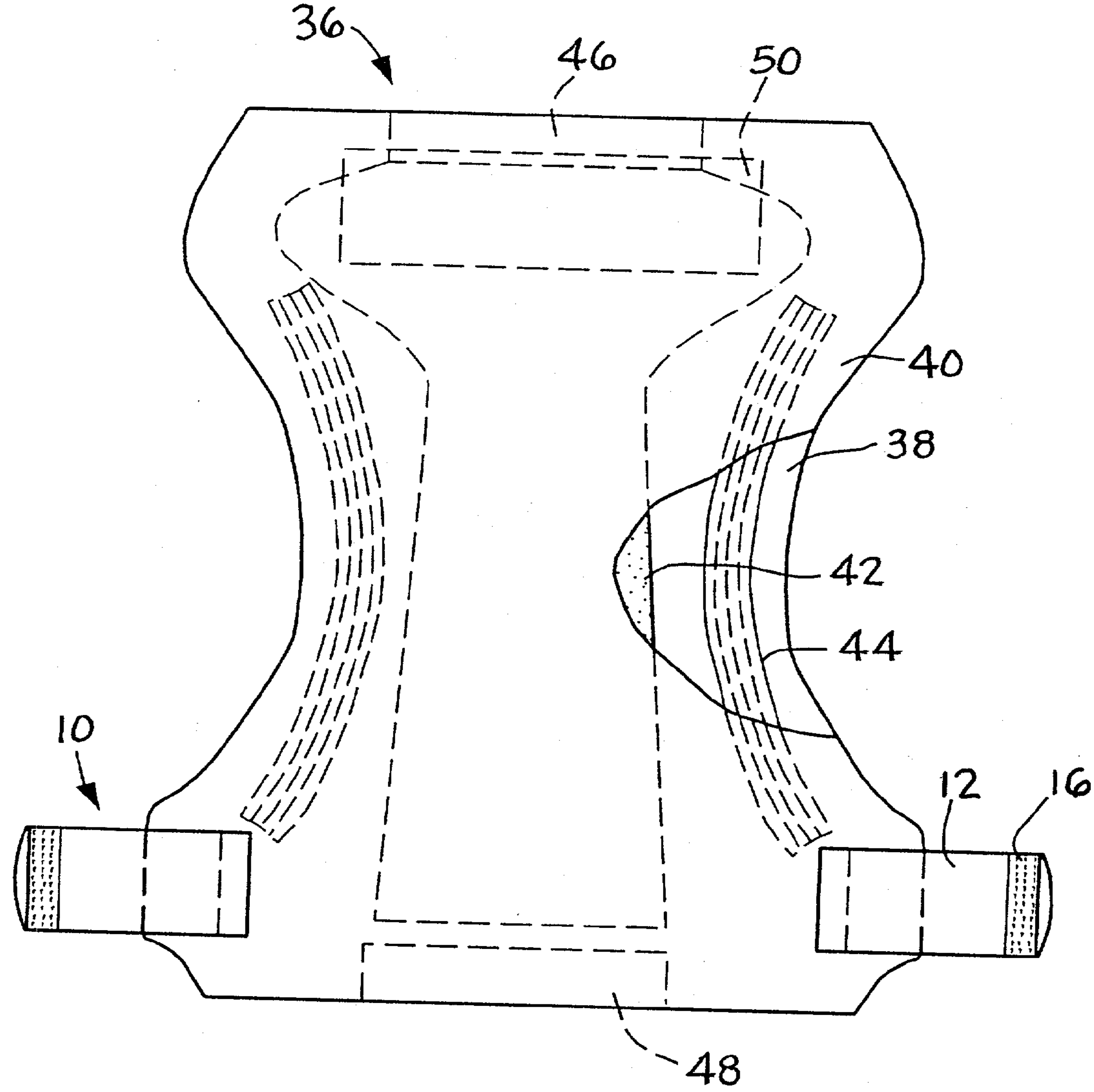


FIG. 7

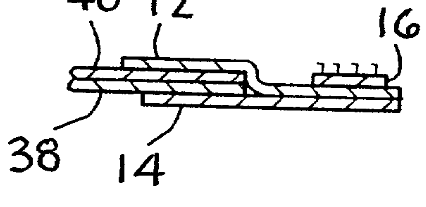


FIG. 8

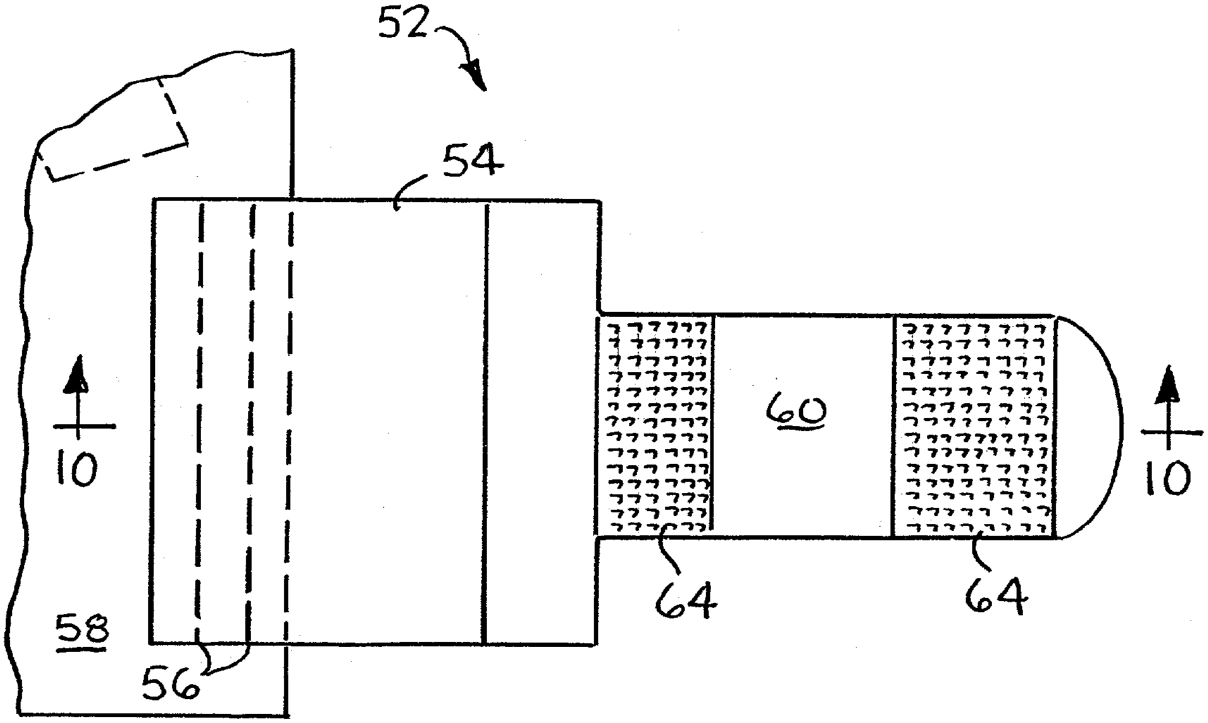


FIG. 9

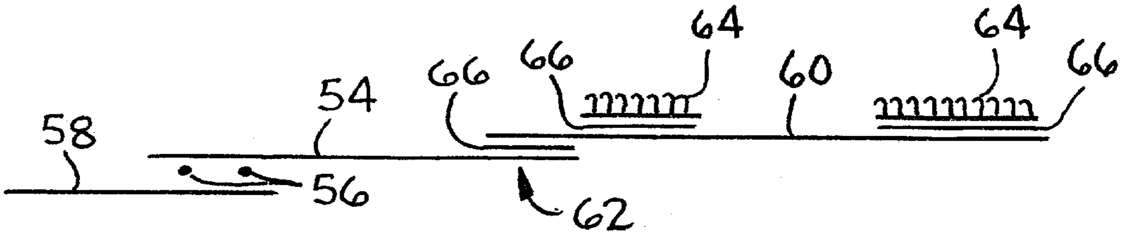


FIG. 10

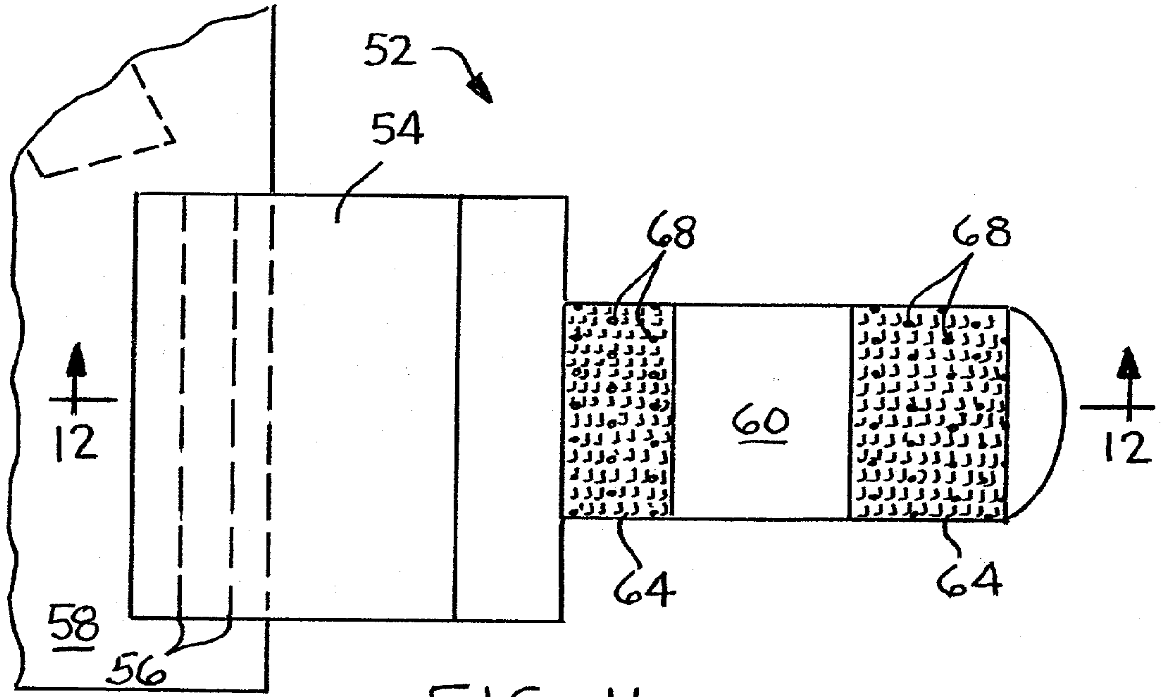


FIG. 11

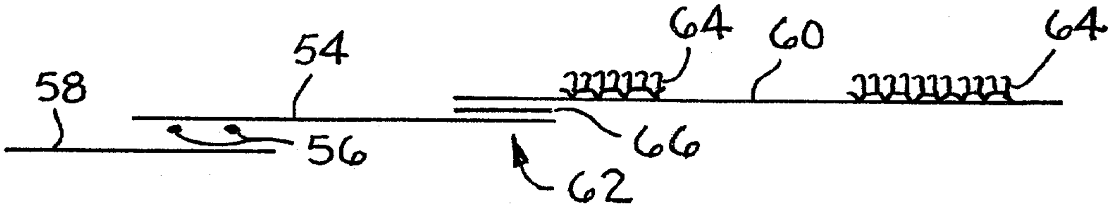


FIG. 12

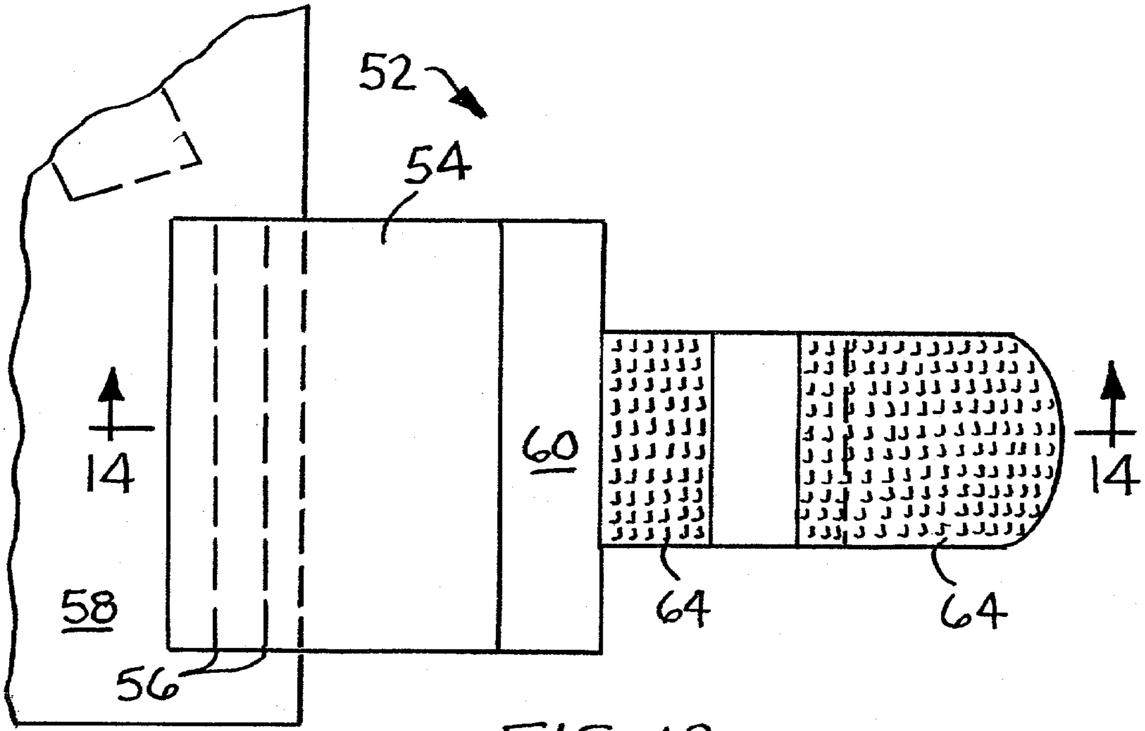


FIG. 13

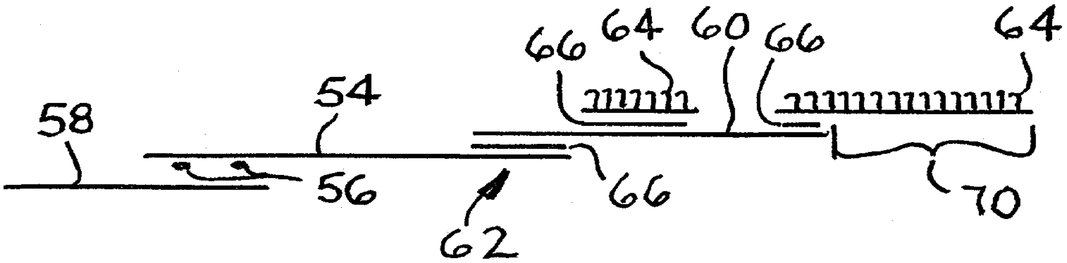


FIG. 14

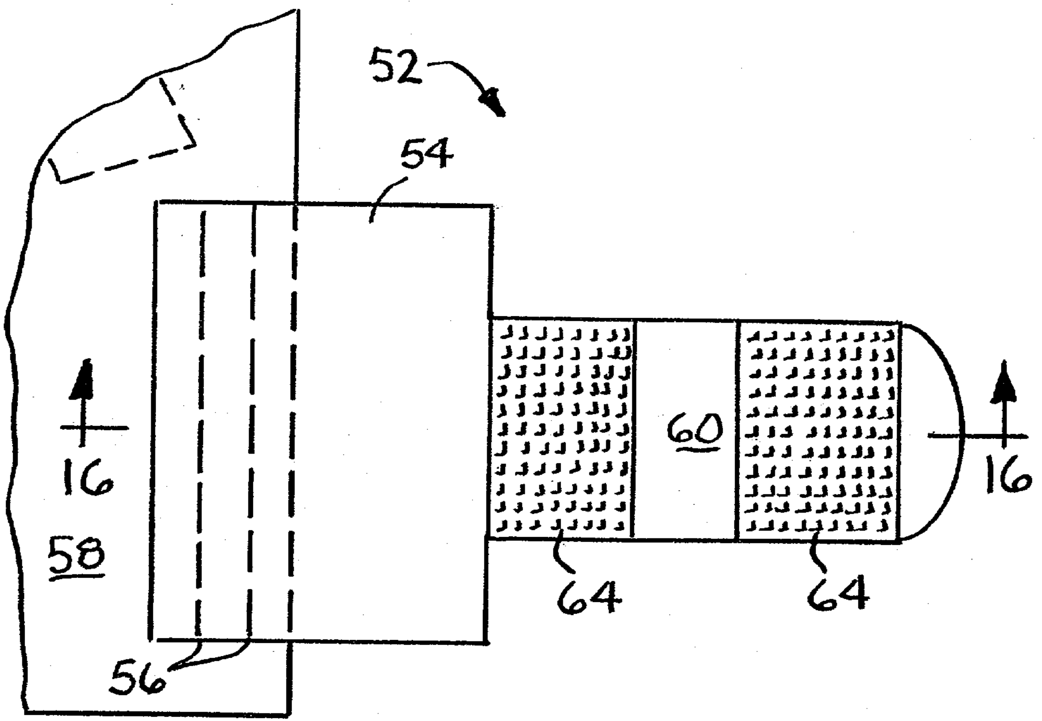


FIG. 15

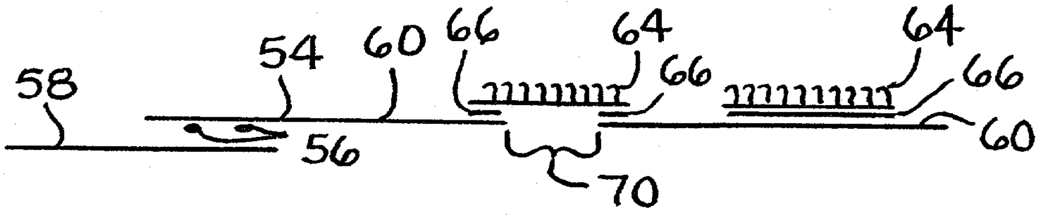


FIG. 16

FLEXIBLE MECHANICAL FASTENING TAB

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a mechanical fastening tab suitable for use on a disposable absorbent product. Specifically, the present invention relates to a mechanical fastening tab having improved flexibility.

[0002] Disposable absorbent products such as diapers, adult incontinence products, and the like are known to those skilled in the art. Similarly, mechanical fastening means for fastening such absorbent products about the waist of a wearer are similarly known to those skilled in the art. Examples of known mechanical fasteners include hook-and-loop type fasteners.

[0003] Unfortunately, mechanical fasteners such as hook-and-loop type fasteners have not been widely used on commercial disposable absorbent products. One reason for the fact that mechanical fasteners have not been widely used commercially on disposable absorbent products is that such mechanical fasteners tend to be relatively expensive and thus difficult to use economically on a disposable product. This is particularly true when the mechanical fasteners are designed to have fastening properties which render them suitable for use on disposable absorbent products. Similarly, mechanical fasteners which are inexpensive enough to use on a disposable absorbent product tend to have fastening properties which are insufficient for satisfactory use on disposable absorbent products.

[0004] Specifically, in use, mechanical fasteners on disposable absorbent products are generally subjected to both shear and peel forces. As used herein, shear forces are intended to refer to forces which are applied to the mechanical fasteners in a plane generally parallel to the plane of attachment between the fastener components. Peel forces are intended to refer to a force applied at an angle of 90 degrees or greater to separate the fastener components of a mechanical fastening tab in a peeling fashion. A mechanical fastener which does not possess sufficient resistance to shear and peel forces would, in use on a disposable absorbent product, tend to disengage, resulting in the disposable absorbent product losing its securement about the waist of a wearer. This is, obviously, undesirable.

[0005] Accordingly, it is desirable to provide mechanical fasteners suitable for use on disposable absorbent products, which mechanical fasteners are inexpensive enough to render their use on a disposable product feasible, and yet which possess sufficient resistance to peel and shear forces to produce a disposable absorbent product which is satisfactory in use. It is to this goal that the present invention is directed.

SUMMARY OF THE INVENTION

[0006] The present invention relates to a mechanical fastening tab for use on a disposable absorbent product. The fastening tab comprises a substrate adapted to be joined to said disposable absorbent product. The fastening tab further comprises a first mechanical fastener component joined to said substrate. The first mechanical fastener component is adapted to releasably engage with a second mechanical fastener component. The fastening tab has a Gurley stiffness value of less than about 1000 milligrams in an area of said fastening tab including said first mechanical fastener component.

[0007] In a second aspect, the present invention relates to a disposable product comprising an outer cover, and, optionally, a bodyside liner, and an absorbent core located between said outer cover and said bodyside liner. The disposable product further comprises a mechanical fastening tab, said mechanical fastening tab comprising a substrate joined to said disposable absorbent product and a first mechanical fastener component joined to said substrate. The first mechanical fastener component is adapted to releasably engage with said outer cover. The fastening tab has a Gurley stiffness value of less than about 1000 milligrams in an area of said fastening tab including said first mechanical fastener component.

[0008] In another aspect, the present invention relates to a disposable absorbent product comprising an outer cover, a bodyside liner and an absorbent core located between the outer cover and the bodyside liner. The outer cover comprises a film material having attached thereto a nonwoven material to form a laminate. The laminate has a Gurley stiffness value of less than 100 milligrams. The disposable absorbent product further comprises a mechanical fastening tab. The mechanical fastening tab comprises a substrate joined to the disposable absorbent product and a first mechanical fastener component joined to the substrate. The first mechanical fastener component is adapted to releasably engage with the laminate. The fastening tab has a Gurley stiffness value of less than about 1000 milligrams in an area of the fastening tab including the first mechanical fastener. In one specific embodiment, when the first mechanical fastener component is releasably engaged with the laminate and is subjected to shear forces, the laminate deforms to dissipate a portion of said shear forces.

[0009] In another aspect, the present invention relates to a disposable product comprising an outer cover having attached thereto a second mechanical fastener component. The product further includes a mechanical fastening tab. The mechanical fastening tab comprises a substrate joined to said disposable product and a first mechanical fastener component joined to said substrate. The first mechanical fastener component is adapted to releasably engage with the second mechanical fastener component. The fastening tab has a Gurley stiffness value of less than about 1000 milligrams in an area of said fastening tab including said first mechanical fastener component.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] **FIG. 1** illustrates one embodiment of a fastening tab according to the present invention.

[0011] **FIG. 2** illustrates an exploded perspective view of the fastening tab illustrated in **FIG. 1**.

[0012] **FIG. 3** illustrates one embodiment of a fastening tab according to the present invention.

[0013] **FIG. 4** is a cross-sectional view of the fastening tab illustrated in **FIG. 3** taken along line **4-4** of **FIG. 3**.

[0014] **FIG. 5** is a top plan view of one embodiment of a fastening tab according to the present invention.

[0015] **FIG. 6** is an exploded perspective view of the fastening tab illustrated in **FIG. 5**.

[0016] **FIG. 7** is a top plan view of an infant diaper according to the present invention.

[0017] **FIG. 8** is a cross-sectional view taken along line **8-8** of **FIG. 7**.

[0018] **FIG. 9** is a top plan view of one embodiment of a fastening tab according to the present invention.

[0019] **FIG. 10** is a cross-sectional view taken along line **10-10** of **FIG. 9**.

[0020] **FIG. 11** is a top plan view of one embodiment of a fastening tab according to the present invention.

[0021] **FIG. 12** is a cross-sectional view taken along line **12-12** of **FIG. 11**.

[0022] **FIG. 13** is a top plan view of one embodiment of a fastening tab according to the present invention.

[0023] **FIG. 14** is a cross-sectional view taken along line **14-14** of **FIG. 13**.

[0024] **FIG. 15** is a top plan view of one embodiment of a fastening tab according to the present invention.

[0025] **FIG. 16** is a cross-sectional view taken along line **16-16** of **FIG. 15**.

DETAILED DESCRIPTION OF THE INVENTION

[0026] The present invention relates to a mechanical fastening tab suitable for use on a disposable absorbent product. The present invention can best be understood by reference to the drawings wherein **FIG. 1** illustrates a fastening tab according to the present invention. Fastening tab **10** comprises a first substrate **12** and a second substrate **14** joined to the first substrate **12**. The first substrate **12** and/or the second substrate **14** are adapted to be joined to a disposable absorbent product.

[0027] A first mechanical fastener component **16** is joined to the first substrate **12**. The first mechanical fastener component is adapted to releasably engage with a second mechanical fastener component. The fastening tab **10** has a Gurley stiffness value of less than about 1000 milligrams in an area of said fastening tab including said mechanical fastener component **16**.

[0028] Transverse end **18** of fastening tab **10** is adapted to be attached to a disposable absorbent product to form a manufacturer's bond end of the fastening tab **10**. The manufacturer's bond end refers to the portion of the fastening tab **10** which includes a bond which attaches the fastening tab to the disposable absorbent product, which bond is formed during the manufacturing process of the disposable absorbent product. The bond which defines the manufacturer's bond end is generally intended to be a permanent bond which can only be destructively broken to remove the fastening tab from the disposable absorbent product.

[0029] The disposable absorbent product to which the fastening tab **10** is attached will have a machine direction (MD) and a cross-machine direction (CD). The machine direction is intended to refer to that direction which corresponds to the length (as defined by the longitudinal centerline) of the product. The cross-machine direction refers to a direction generally perpendicular to the machine direction. The dimension of the fastening tab **10** which is generally parallel to the machine direction of the product to which fastening tab **10** is attached will similarly be considered the machine direction of fastening tab **10**. That is, the machine direction of the fastening tab **10** will be that direction generally parallel to the machine direction of the product to which fastening tab **10** is intended to be joined. In the illustrated embodiment, the direction indicated by arrow **20** indicates the machine direction of the fastening tab **10**. The direction indicated by arrow **22** generally corresponds to the cross-machine direction of the fastening tab **10** in that it is generally parallel to the cross-machine direction of the disposable absorbent product to which fastening tab **10** is intended to be joined (see **FIG. 1**).

[0030] **FIG. 2** illustrates an exploded perspective view of the fastening tab **10** illustrated in **FIG. 1**. While the fastening tab illustrated in **FIG. 1** and **FIG. 2** are shown as comprising a first and second substrate, it is to be understood that the fastening tab illustrated in **FIGS. 1 and 2** could similarly be formed from a single substrate corresponding to either the first or second substrate.

[0031] As used herein, reference to a first mechanical fastener component is intended to refer to a material which is adapted to mechanically interlock with a second material. Any such material is suitable for use as the first mechanical fastener component. In the illustrated embodiment, the first mechanical fastener component is the hook portion of a hook-and-loop fastener. Hook-and-loop fasteners are known to those skilled in the art. A hook-and-loop fastener generally comprises a hook material and a loop material. The hook material generally comprises a base sheet material from which stemlike projections extend. One end of the stemlike projection is attached to the base sheet material, while the other end of the stemlike projection defines a hook, or hook-like structure such as a mushroom, which is adapted to interlock with a loop or loop-like material. The loop or loop-like material generally comprises a knit, woven or nonwoven material defining individual loops of material which can interlock with the hook-like material. The loop or loop-like material may be attached to a substrate to form a laminate.

[0032] Exemplary of a hook material suitable for use in the present invention is that obtained from Velcro Group Company, Manchester, N.H., under the trade designation CFM-22-1097; CFM-22-1121; CFM-22-1162; CFM-25-1003; CFM-29-1003. Suitable hook materials generally comprise from about 100 to about 4000 hooks per square inch (about 16 to about 620 hooks per square centimeter), alternatively from about 800 to about 2500 hooks per square inch (about 124 to about 388 hooks per square centimeter), alternatively from about 1000 to about 2000 hooks per square inch (about 155 to about 310 hooks per square centimeter). The hooks suitably have a height of from about 0.001 inch (0.00254 centimeter) to about 0.075 inch (0.19 centimeter), alternatively of from about 0.015 inch (0.0381 centimeter) to about 0.03 inch (0.0762 centimeter).

[0033] Other hook materials suitable for use in the present invention include a hook material available from the Minnesota Mining and Manufacturing Company, St. Paul, Minn., under the designation CS 200.

[0034] The hook material of the present invention may be formed from a polymeric material having a flexural modulus greater than about 30 kilopounds per square inch (kpsi), suitably of from about 50 kpsi to about 300 kpsi, alternatively of from about 150 kpsi to about 50 kpsi.

[0035] When the polymeric material from which the hook material of the present invention is formed has a relatively high flexural modulus, this property tends to render the hook material less flexible. This, in turn, tends to cause the fastening tab to have a relatively high Gurley stiffness value. Accordingly, when the polymeric material from which the hook material is formed has a relatively high flexural modulus, it is desirable to alter other aspects of the fastening tab or hook material to meet the Gurley stiffness targets described above.

[0036] For example, the base sheet material from which the stemlike hook projections extend can be fabricated to be much thinner than normally associated with known hook materials. For example, the base sheet material from which the hooks extend may have a thickness of from about 0.001 inch to about 0.020 inch (about 0.00254 centimeter to about 0.0508 centimeter), alternatively of from about 0.002 inch to about 0.015 inch (about 0.00508 centimeter to about 0.0381 centimeter).

[0037] The use of a polymeric material having a relatively high flexural modulus has generally been found to increase the peel strength of a hook material when engaged with a loop material. Accordingly, in one embodiment, a polymeric material from which the hook material is formed has a flexural modulus of greater than about 100 kpsi.

[0038] In an alternative embodiment, the polymeric material from which the hook material is formed is relatively soft and has a flexural modulus less than about 50 kpsi. Due to the soft nature of such polymeric materials, it is generally possible to employ a hook material having a thicker base sheet and still produce a fastening tab having a desirable Gurley stiffness value.

[0039] Other aspects of hook material design can affect the flexibility of the hook material. For example, hook orientation, spacing, backing thickness, hook thickness, and the like. Such aspects of hook design affect the flexibility of the hook material in both the machine and cross machine directions.

[0040] Any flexible material having the required physical strength to perform a fastening function as described herein is believed suitable for use as the first and/or second substrate material. Examples of materials suitable for use as the first and second substrate material include thermoplastic or thermosetting films such as polyolefin films, polyurethane films, and the like; nonwoven materials such as meltblown or spunbond polyolefin; woven materials; nonwoven composites; nonwoven/film composites; and the like. Elastomerically stretchable webs can also be used as the first and/or second substrate material. The elastomeric webs can be composed of a stretch-bonded-laminate (SBL) material, a neck-bonded-laminate (NBL) material, an elastomeric film, an elastomeric foam material, or the like. For example, suitable meltblown elastomeric fibrous webs are described in U.S. Pat. No. 4,663,220 issued May 5, 1987, to A. Wisneski et al., the disclosure of which is hereby incorporated by reference. Examples of composite fabrics comprising at least one layer of nonwoven textile fabric secured to a fibrous elastic layer are described in European Patent Application No. EP 0 110 010 published on Apr. 8, 1987, with the inventors listed as J. Taylor et al., the disclosure of which is hereby incorporated by reference. Examples of NBL materials are described in U.S. Pat. No. 5,226,992 issued Jul. 13, 1993, to Mormon, the disclosure of which is hereby incorporated by reference. When the substrate comprises a thermoplastic or thermosetting film, the substrate may be integrally formed with the first mechanical fastener component. That is, the substrate may comprise an extension of the backing of the first mechanical fastener component.

[0041] Naturally, the physical properties of the first and/or second substrate materials will affect the flexibility of the fastening tab illustrated in **FIG. 1**. Accordingly, it is generally desired that the first and/or second substrate materials be selected to be relatively flexible, thus enabling the fastening tab of the present invention to possess the desired Gurley stiffness value. Specifically, it is desired that the first and/or second substrate materials have a Gurley stiffness value of less than about 1000 milligrams, alternatively of less than about 200 milligrams, alternatively of less than about 75 milligrams measured in at least the machine direction.

[0042] Any method capable of attaching the first and second substrates to one another and/or the first mechanical fastener component to the first substrate is believed suitable for use in the present invention. For example, the materials may be attached together by adhesives, thermal bonding (including ultrasonic bonding), sewing, combinations of these methods, and the like. In one preferred embodiment of the present invention, the first mechanical fastener component is attached to the first substrate with both adhesive and thermal bonds. Again, the method of attaching the first and/or second substrates together as well as the method for attaching the first mechanical fastener component to the first substrate can affect the flexibility (as measured by the Gurley stiffness) of the fastening tab. Accordingly, the method of attachment must be carefully chosen to enable the fastening tab to possess the desired Gurley stiffness value.

[0043] The fastening tabs of the present invention have a Gurley stiffness value of less than about 1000 milligrams, alternatively of less than about 500 milligrams, alternatively of less than about 200 milligrams, alternatively of less than about 75 milligrams, in an area of said fastening tab including said first mechanical fastener component. The area of said fastening tab including said first mechanical fastening component and having the Gurley stiffness values described above, is suitably at least about 1 square centimeter in size, alternatively of at least about 2 square centimeters in size.

[0044] The fastening tabs of the present invention will be considered to have the desired Gurley stiffness values when the fastening tabs have a desired Gurley stiffness value measured in either the machine or cross direction of the fastening tabs **10**. It is generally desired that the fastening tabs have the desired Gurley stiffness values in both the machine and cross direction of the fastening tabs.

[0045] With reference to **FIGS. 3 and 4** in which like numerals represent like elements, the fastening tab **10** comprises a first substrate **12** and a first mechanical fastener component **16**. As can be seen from reference to **FIG. 4**, the first mechanical fastener component **16** comprises a base sheet material **24** and hooks **26**. The base sheet material is relatively thick and thus would tend to increase the Gurley stiffness of the fastening tab **10** illustrated in **FIGS. 3 and 4**. Nonetheless, the first fastening component **16** is attached to the first substrate **12** by ultrasonic bonding along bond lines **28**. The presence of bond lines **28** have been found to render the fastening tab **10** illustrated in **FIGS. 3 and 4** relatively flexible in the machine direction **20** of the fastening tab **10**.

[0046] The bond lines **28** suitably have a width of about 0.004 inch to about 0.02 inch, alternatively from about 0.006 inch to about 0.012 inch. Similarly, the flexibility of the fastening tab **10** is affected by the frequency of the bond lines **28**. Accordingly, the first mechanical fastener component **16** is suitably attached to the first substrate **12** by bond lines **28** having a frequency of about 3 to about 12 bond lines per inch, alternatively of from about 5 to about 10 bond lines per inch in the machine direction **20** of the fastening tab **10**.

[0047] The fastening tabs illustrated in **FIGS. 3 and 4** will, due to the presence of bond lines **28**, generally be more flexible in the machine direction **20** than in the cross direction **22** of the fastening tab **10**. Indeed, the presence of bond lines **28** may increase the stiffness of the fastening tab **10** in the cross direction **22** of the fastening tab. Nonetheless, as described above, as long as the fastening tab **10** has a Gurley stiffness value of less than about 1000 milligrams, improved fastening is generally achieved.

[0048] **FIGS. 5 and 6** illustrate an alternative embodiment of the fastening tab according to the present invention. In the embodiment illustrated in **FIGS. 5 and 6**, fastening tab **10**, again comprises a first substrate **12** and a first mechanical fastener component **16**. As can be seen from reference to **FIG. 6**, the first mechanical fastener component **16** is attached to the first substrate **12** along transverse end **30** of the first substrate **12** such that the first substrate **12** incompletely overlays the first mechanical fastener component **16**. That is, the first mechanical fastener component is attached to the first substrate **12** only in overlapped portion **32** and is not overlaid by the first substrate **12** in non-overlapped portion **34**. By forming the fastening tab **10** such that the first mechanical fastener component **16** is not completely overlaid by the first substrate **12**, the flexibility of mechanical fastening tab **10** in an area comprising the first mechanical fastener component can be improved. When the first mechanical fastener component is not completely overlaid by the first substrate, it is generally desired that from about 98 to about 2 percent, alternatively from about 98 to about 30 percent of one planar surface of the first mechanical fastener component not be overlaid by the first substrate.

[0049] In contrast, FIGS. **1**-**4** illustrate fastening tabs in which the first mechanical fastener component **16** is completely overlaid by the first substrate **12**. That is, 100 percent of one planar surface of the first mechanical fastener component **16** is overlaid by one planar surface of the first substrate **12**.

[0050] **FIGS. 7 and 8** illustrate a fastening tab according to the present invention in use on a disposable infant diaper. While the fastening tabs of the present invention are illustrated in use on an infant diaper, it is to be understood that the fastening tabs are equally well suited for use on disposable products such as adult incontinence products and the like.

[0051] Those skilled in the art will recognize that diaper **36** generally comprises an outer cover **38**, an inner bodyside liner **40**, and an absorbent core **42** located between the outer cover **38** and the bodyside liner **40**. Leg elastics **44** are located generally at the longitudinal edges of the diaper **36**. The diaper further comprises a front waist elastic **46** and a rear waist elastic **48**. The fastening tabs of the present invention are generally attached at the rear of the diaper. In the illustrated embodiment, the fastening tab illustrated has the construction illustrated in **FIGS. 1 and 2**. Accordingly, the fastening tab is attached by sandwiching the outer cover **38** and bodyside liner **40** between the first substrate **12** and the second substrate **14** in an area where the first and second substrates are not attached to one another. This aspect of the invention can best be seen by reference to **FIG. 8**. In the embodiment illustrated in **FIG. 8**, diaper **36** further comprises a second mechanical fastener component **50**. The second mechanical fastener component is generally located at the front of the diaper **36**. In the illustrated embodiment, the first mechanical fastener component comprises the hook material and the second mechanical fastener component comprises a loop material. The first and second mechanical fastener components can interlock with one another to fasten the diaper **36** about the waist of a wearer. Those skilled in the art will recognize that the relative positions of the hook-and-loop materials could be reversed on diaper **36**.

[0052] Specific examples of disposable absorbent products on which the fastening tabs of the present invention may be utilized are disclosed in the following U.S. patents and patent applications: U.S. Pat. No. 4,798,603 issued Jan. 17, 1989, to Meyer et al.; U.S. Pat. No. 5,176,668 issued Jan. 5, 1993, to Bernardin; U.S. Pat. No. 5,176,672 issued Jan. 5, 1993, to Bruemmer et al.; U.S. Pat. No. 5,192,606 issued Mar. 9, 1993, to Proxmire et al.; U.S. patent application Ser. No. 08/096,654 filed Jul. 22, 1993, in the name of Hanson et al. and U.S. patent application Ser. No. 08/263,281 filed Jun. 21, 1994, in the name of Dilnik et al.

[0053] Exemplary of a loop material suitable for use as the second mechanical fastener component **50** illustrated in **FIG. 7** is that obtained from Guilford Mills, Inc., Greensboro, N.C., under the trade designations Style 19902, Style 34285 or Style 30020. Other suitable loop materials are shown, for example, in U.S. Pat. No. 5,019,073 issued May 28, 1991, to Roessler et al., the disclosure of which is incorporated by reference herein. Suitable loop materials may include woven, knitted, or nonwoven materials. Suitable nonwoven materials are those formed through a spunbond or meltblown process and have a basis weight of from about 0.1 ounce per square yard to about 2.0 ounces per square yard, alternatively of from about 0.5 ounce per square yard to about 1.25 ounce per square yard, alternatively of from about 0.75 to about 1.0 ounce per square yard. The fibers of such nonwoven material are suitably formed from polymeric materials such as polyolefins, polyamides, polyesters, rayon, combinations of the above, and the like. Such nonwoven materials generally have a fiber denier within the range of from about 1d to about 15d, preferably of from about 2d to about 5d.

[0054] The second mechanical fastener component can be a discrete element located on the outer surface of a disposable absorbent product in a manner such as that illustrated in **FIG. 7**. Alternatively, the second mechanical fastener component may comprise the entire outer surface of the disposable absorbent product such as when the outer cover is the second mechanical fastener component. In one specific embodiment, the outer cover of the disposable absorbent product is a film/nonwoven laminate known as a stretch thermal laminate comprising a 0.6 mil (0.015 millimeter) polypropylene blown film and 0.7 ounce per square yard (23.6 grams per square meter) polypropylene spunbond material. The spunbond material is composed of about 2.0 denier fibers. The stretch thermal laminate is formed by stretching the polypropylene film, in one direction, until it is extended by 25 percent. The spunbond polypropylene is then brought into face-to-face contact with the stretched polypropylene film. The polypropylene film and spunbond material are then thermally bonded together at spaced intervals. The resulting laminate has a plurality of separate and distinct bond sites with an overall bond area of about 13 percent per unit area. After the film and spunbond material are laminated to one another, the laminate is allowed to relax. The film layer retracts about 10 percent, thereby leaving the film permanently deformed to a length of about 15 percent greater than its original length. The process for forming the stretch thermal laminate is described in greater detail in commonly-owned copending U.S. patent application Ser. No. 07/997,800, filed Dec. 29, 1992, in the name of McCormack at al., the contents of which are incorporated herein.

[**0055**] Applicants have found that, when the second mechanical fastener component comprises a nonwoven material, it is generally desired that the hooks be relatively small, having a height of no more than about 0.02 inch, and being present at a density of from about 900 to about 2500 hooks per square inch (140 to about 280 hooks per square centimeter). Suitable hook materials are those described above as the CFM-25-1003, CFM-29-1003 and CS 200 hook materials.

[**0056**] Applicants have discovered that it is desirable to have the second mechanical fastener component be extremely flexible. Thus, the woven or knit materials such as those described above have been found to be particularly well suited for use in the present invention. For example, the loop material obtained from Guilford Mills has a Gurley stiffness value of less than about 6 milligrams. When the Guilford Mills loop material is adhesively attached to a stretch thermal laminate (STL) outer cover, the loop/STL composite has a Gurley stiffness value of less than about 40 milligrams in both the MD and CD directions. The stretch thermal laminate material described above has been found to have a Gurley stiffness value of less than about 10 milligrams in both the MD and CD directions. The stretch thermal laminate is capable of performing both the function of a liquid impervious film and a second mechanical fastener component (loop material). Thus, the Gurley stiffness of the stretch thermal laminate can represent the stiffness of the second mechanical fastener component. In contrast, the Guilford Mills loop material is attached to a substrate such as the STL material such that the loop/STL composite may represent the stiffness of the second mechanical fastener component and the material to which it is directly attached.

[**0057**] Applicants have discovered that it is desirable that the second mechanical fastener component itself (no other attached components) have a Gurley stiffness value of less than about 100 milligrams, alternatively of less than about 75 milligrams, alternatively of less than about 50 milligrams, alternatively of less than about 20 milligrams. It is also desired that the second mechanical fastener component and any other components of a disposable absorbent product to which it is directly attached have a Gurley stiffness value of less than about 1000 milligrams, alternatively of less than about 500 milligrams, alternatively of less than about 200 milligrams, alternatively of less than about 75 milligrams, alternatively of less than about 50 milligrams.

[**0058**] In one preferred embodiment of the present application, the ratio of the Gurley stiffness value of the fastening tab and the Gurley stiffness value of the second mechanical fastener component itself, is from about 1:10 to 10:1, alternatively from about 1:5 to 5:1. By having the Gurley stiffness ratio of the fastening tab and second mechanical fastening component itself be within the ranges described above, improved fastening can be achieved. In another embodiment of the present invention, the ratio of the Gurley stiffness value of the fastening tab and the Gurley stiffness value of the second mechanical fastener component and any other components of a disposable absorbent product to which the second mechanical fastener component is directly attached is from about 1:10 to 10:1, alternatively from about 1:5 to 5:1.

[**0059**] Further, when the fastening tab and the second mechanical fastener component itself are in an engaged relationship to form a fastener composite, it is desired that the fastener composite have a Gurley stiffness value of less than about 1000 milligrams, alternatively of less than about 500 milligrams, alternatively of less than about 200 milligrams, alternatively of less than about 75 milligrams.

[**0060**] In one embodiment of the present invention, the second mechanical fastener component and/or a component to which it is attached is able to deform during the application of shear forces when the fastening tab and second mechanical fastener component are engaged. For example, the second mechanical fastener component may be formed from or attached to an elastomeric material or a stretchable material having a low modulus. The ability of the second mechanical fastener component to deform when subjected to shear forces allows the shear forces being applied to the second mechanical fastener component to be dissipated over a larger area. Thus, the shear forces which are being applied are not concentrated in the area where the fastening tab is engaged with the second mechanical fastener component.

[**0061**] FIGS. **9**-**16** illustrate specific embodiments of the fastening tabs according to the present invention. With reference to **FIGS. 9 and 10**, mechanical fastening tab **52** comprises an elastomeric material **54** which is attached by bond lines **56** to bodyside liner **58**. A first substrate **60** is attached to elastomeric material **54** in overlap area **62**. Hook material **64** is attached to first substrate **60** by adhesive layers **66**. Locating the hook material **64** on the first substrate **60** in an area other than overlap area **62** has been found to increase the flexibility (lower the Gurley stiffness) of the mechanical fastening tab **52**.

[**0062**] **FIGS. 11 and 12** illustrate an embodiment of the fastening tabs of the present invention similar to those illustrated in **FIGS. 9 and 10**. Accordingly, like numerals in **FIGS. 11 and 12** represent like elements from **FIGS. 9 and 10**. The fastening tabs illustrated in **FIGS. 11 and 12** differ from those illustrated in **FIGS. 9 and 10** in that hook materials **64** are thermally bonded to the first substrate **60** at bond points **68**. Replacing the adhesive layer **66** illustrated in **FIGS. 9 and 10** with the bond points **68** illustrated in **FIGS. 11 and 12** has been found to produce a fastening tab which may be more flexible due to the removal of the adhesive layer **66**.

[**0063**] **FIGS. 13 and 14** illustrate another alternative embodiment of fastening tab **52**. Again, like numerals appearing in **FIGS. 13 and 14** represent like elements appearing in FIGS. **9-12**. The fastening tab illustrated in **FIGS. 13 and 14** is identical to that illustrated in **FIGS. 9 and 10** with the exception that the hook material **64** located on the end of fastening tab **52** opposite that end attached to bodyside liner **58** is not completely overlaid by the first substrate **60**. That is, a portion **70** of hook material **64** is not in an overlapping relationship with the first substrate **60**. Thus, the portion **70** of fastening tab **52** has an increased flexibility due to the absence of adhesive layer **66** and first substrate **60** in portion **70**.

[**0064**] **FIGS. 15 and 16** illustrate a further alternative embodiment of fastening tab **52**. Again, like numerals in **FIGS. 15 and 16** represent like elements from FIGS. **9-12**. The fastening tab illustrated in **FIGS. 15 and 16** is similar to that illustrated in **FIGS. 13 and 14** with the exception that the first substrate **60** has been divided into two pieces, which pieces are joined to hook materials **64** to define portion **70** of the hook material **64** which is not overlaid by the first substrate **60**. This again has been found to increase the flexibility of the fastening tab **52** in that portion **70** which is not overlaid by the first substrate **60**.

[**0065**] The fastening tab and hook material may have other alternative shapes and configurations. For example, such shapes and configurations are described in U.S. patent application Ser. No. ______ (attorney Docket number 11,571) filed on even date herewith in the name of Zehner et al. which is hereby incorporated by reference.

[**0066**] Test Methods

[**0067**] Gurley Stiffness

[**0068**] A suitable technique for determining Gurley Stiffness values is set forth in TAPPI Standard Test T 543 om-94 (Stiffness of paper (Gurley type stiffness tester)). A suitable testing apparatus is a Gurley Digital Stiffness Tester: Model 4171-D manufactured by Teledyne Gurley, 514 Fulton Street, Troy, N.Y. 12181-0088. This instrument allows the testing of a wide variety of materials through the use of various lengths and widths in combination with the use of a 5, 25, 50, or 200 gram weight placed in one of three positions on the pointer of the apparatus. For purposes of the present description, the stated Gurley stiffness values are intended to correspond to the values that would be generated by a "standard" sized sample. Accordingly, the scale readings from the Gurley stiffness tester are appropriately converted to the stiffness of a standard size sample and are expressed in terms of milligrams. The standard size sample has a width of 1" and a nominal length of 3" (actual length of 3.5"). The actual length of the sample is the nominal length, plus an additional 0.25" of length for holding in the clamp and another 0.25" of length for overlapping the vane. Tables of factors for taking scale readings generated with non-standard sized test samples and converting the readings to the stiffness of the standard size sample are given in the Instruction Manual for the Gurley Stiffness Tester provided by Teledyne Gurley. Accordingly, other designated dimensions for the test sample may also be conveniently employed so long as the appropriate conversion factor is employed to determine the appropriate value which corresponds to the standard size sample.

EXAMPLES

Example 1

[**0069**] A fastening tab is formed employing a hook material available from Velcro Group Company under the trade designation CFM-22-1056 (also known as HTH-856). The hook material has a hook height (from the top surface of the base film, theoretical values) of 0.028 inch and a hook width (at the widest location, theoretical values) of about 0.008 inch. The hook material has a base film thickness of 0.009-0.012 inch, a hook density of 890 hooks per square inch, and is formed from a polymeric material having a flexural modulus of 110-140 kilo pounds per square inch.

[**0070**] The hook material described above is attached to a neck-bonded-laminate (NBL) material to form a fastening tab. The hook material has a dimension of 1.75 inches by 0.5 inch. The neck-bonded-laminate (NBL) is formed as described in U.S. Pat. No. 5,226,992 issued Jul. 13, 1993, to Morman. The NBL employed included three layers. The outer two layers were polypropylene spunbond layers having a basis weight of 1.4 ounce per square yard and being formed from 2-3 denier fibers. The center layer was an elastomeric film having a basis weight of 45 grams per square meter and being formed from Kraton™ 2740X, a polymeric resin available from Shell Chemical Company. The NBL material has a length of 4 inches and a width of 2.75 inches. The hook material is attached to the NBL material by ultrasonic (about 6.25 percent bond area) and adhesive bonding. A 1.0 ounce per square yard spunbond material (1.0 inch×0.75 inch) is located between the hook material and the NBL material.

[**0071**] Additional fastening tabs are formed in the same manner except that bond lines, such as those illustrated in **FIGS. 3 and 4**, are formed in the fastening tabs. The bond lines have a width of about 0.5 centimeter and extend across the entire machine direction of the material. Three bond lines were formed on the fastening tab. In one case, the bond lines were registered such that one bond line was located approximately 0.635 centimeter from each end of the hook material (CD direction) and one bond line was located generally in the center of the cross direction length of the hook material (Registered bond lines). In an alternative embodiment three bond lines were formed on each fastening tab, but the bond lines were unregistered so that the location of the bond lines along the cross direction length of the hook material varied (Unregistered bond lines). These hook materials were then subjected to Gurley stiffness testing. The fastening tabs are then used to replace the mechanical fastening tabs supplied on the commercially available HUGGIES® Supreme diaper (Step 4). That is, the non-elastomeric ears of the HUGGIES® Supreme diaper are replaced with the fastening tabs described above.

[**0072**] The diapers thus formed are subjected to sensory use panel testing. In a sensory use panel, mothers are trained and asked to monitor a number of specific attributes during usage of the test diapers. In this particular test, care givers were asked, inter alia, to monitor the degree of hook irritation and the number of pop-opens (unassisted separation of the hook and loop fastening materials). In the sensory use panel test **60** children used each diaper design for 1 week. Thus, each child was involved in the study for a period of 3 weeks. Each child used all three diaper designs (unbonded, registered bond lines and unregistered bond lines).

[0073] Each of the three diaper designs was used by 20 children during each week of the three week study. The results of this testing are set forth in Table 1.

TABLE 1

	Gurley Stiffness[1]	Number of Diapers	Hook Irritation	Pop-Opens
No bond lines	1818.2*	1785	2.41%	1.85%
Registered bond lines	98.6	1724	1.10%	3.71%
Unregistered bond line	438.7	1685	1.36%	2.91%

*Not an example of the present invention

[1] In milligrams measured in machine direction. (Average of 5 samples.)

[0074] As can be seen from Table 1, the presence of both the registered and unregistered bond lines resulted in lower hook irritation. It is also noted that the number of pop-opens increased. This is believed to be the result of a perceived increase in stiffness in the cross machine direction caused by the bond lines. This demonstrates the importance of flexibility in both the machine direction and the cross machine direction and the need to balance flexibility properties to achieve your desired results.

Example 2

[0075] The Following Materials Are Subjected to Gurley Stiffness Testing

[0076] 1. A hook material available from the Minnesota Mining and Manufacturing Company, St. Paul, Minn., under the designation CS-200.

[0077] 2. A spunbond/meltblown/spunbond material having a basis weight of 1.7 ounces per square yard (57.8 grams per square meter) comprising two outer layers of polypropylene spunbond material having a basis weight of 21.25 grams per square meter. The middle layer comprises polypropylene meltblown fibers having a basis weight of 15.3 grams per square meter.

[0078] 3. A stretch thermal laminate material comprising a 0.6 mil (0.015 millimeter) polypropylene blown film and 0.7 ounce per square yard (23.6 grams per square meter) polypropylene spunbond material. The spunbond material is composed of about 2.0 denier fibers. The stretch thermal laminate is formed by stretching the polypropylene film, in one direction, until it is extended by 25 percent. The spunbond polypropylene is then brought into face-to-face contact with the stretched polypropylene film. The polypropylene film and spunbond material are then thermally bonded together at spaced intervals. The resulting laminate has a plurality of separate and distinct bond sites with an overall bond area of about 13 percent per unit area. After the film and spunbond material are laminated to one another, the laminate is allowed to relax. The film layer retracts about 10 percent, thereby leaving the film permanently deformed to a length of about 15 percent greater than its original length.

[0079] 4. A knit loop material commercially available from Guilford Mills under the trade designation Style 34285.

[0080] 5. A laminate of material 1 with material 2. The laminate is through the use of double-sided adhesive tape such as that available from the Minnesota Mining and Manufacturing Company under the designation #465. Sufficient double sided tape is used to cover the facing surfaces of the two materials.

[0081] 6. The laminate which is material 5 mechanically engaged with material 3. The laminate was mechanically engaged with material 3 with a standard 4.5 lb mechanical roller (available from Chemsultants International located in Mentor, Ohio) by rolling the roller across the materials (in a facing relationship) once in each direction.

[0082] 7. A laminate of material 4 on material 3. The laminate was form as described above in connection with material 5.

[0083] 8. Material **1** mechanically engaged with material 3. The materials were mechanically engaged as described in connection with material 6.

[0084] 9. A laminate of material 3 with material 2 which was then mechanically engaged with material 1. The laminate was formed and mechanically engaged as described above in connection with material 5 and material 6.

[0085] The results of the Gurley stiffness testing are set forth in Table 2. The data set forth in Table 2 represents an average of 10 test repetitions.

TABLE 2

Material	Test Direction[1]	Gurley Stiffness[2]	Std. Deviation
1	MD	16.87	2.05
1	CD	16.54	1.71
2	MD	8.60	1.7
2	CD	29.69	8.51
3	MD	4.77	1.31
3	CD	6.49	5.79
4	MD	5.44	3.29
4	CD	1.39	0.47
5	MD	98.3	22.3
5	CD	185.2	24.7
6	MD	267.4	36.2
6	CD	391.9	53.9
7	MD	28.7	5.3
7	CD	37.5	6.7
8	MD	103.2	18.2
8	CD	122.5	33.5
9	MD	314.1	28.7
9	CD	335.2	52.5

[1] MD = Machine Direction; CD = Cross Direction

[2] In milligrams

Example 3

[0086] The following material was subjected to tensile testing in a manner similar to that described in American Society of Testing and Materials (ASTM) Test Method D-882:

[0087] A laminate of a bonded carded web and a film. The bonded carded web is formed from polypropylene fibers available from Hercules Inc, under the designation T-196. The bonded carded web has a basis weight of 0.77 ounce per square yard (26 grams per square meter). The bonded carded web is adhesively laminated to a breathable film available from The Sam Woo Corporation. The film has a basis weight of 39 grams per square meter. The film was formed from about 26 weight percent linear low density polyethylene, about 10 weight percent high density polyethylene, about 10 weight percent ethylene vinyl acetate, about 48 weight percent of calcium carbonate coated with a fatty acid and about 6 weight percent of other additives. The laminate was tested to determine both the MD and CD tensile strength. The results of this testing are set forth in Table 3.

TABLE 3

Direction	Peak Load	Std. Deviation	Peak Strain	Std. Deviation
CD	759.3	45.6	269.0	138.1
MD	3704.2	295.7	39.4	3.8

All values are in grams force.
Peak Load and Peak Strain values represent the average of 6 repetitions

[0088] The laminate described above and a hook material available from the Minnesota Mining and Manufacturing Company under the designation CS-200 were subjected to shear testing generally as outlined in ASTM test method D-5169. The result of this testing are set forth in Table 4.

TABLE 4

Direction[1]	Peak Load[2]	Std. Deviation	Total Energy[3]	Std. Deviation
MD	1377.5	695.8	0.2212	0.1343
CD	814.13	44.67	2.29	1.16

[1] Direction shear forces applied to laminate material.
[2] In grams force
[3] Tensile Energy Absorbed (TEA) at Peak, in Inch-Pounds per square Inch. Refers to total area under stress/strain curve, to peak, generated during shear testing.

[0089] As can be seen from the above data, the ability of the laminate material to deform during application of shear forces greatly increases the total shear energy which can be applied to the system before failure of the bond between the hook material and the laminate.

[0090] While the present invention has been described in terms of the specific embodiments set forth herein, those skilled in the art will recognize numerous variations and alterations thereof which are intended to be within the scope of the claims appended hereto.

What is claimed is:

1. A mechanical fastening tab for use on a disposable absorbent product, said fastening tab comprising:

a substrate adapted to be joined to said disposable absorbent product; and

a first mechanical fastener component joined to said substrate, said first mechanical fastener component being adapted to releasably engage a second mechanical fastener component, said fastening tab having a Gurley stiffness value of less than about 1000 milligrams in an area of said fastening tab including said first mechanical fastener component.

2. The mechanical fastening tab according to claim 1 wherein said first mechanical fastener component is a hook material.

3. The mechanical fastener component according to claim 2 wherein said hook material has a Gurley stiffness value of less than about 1000 milligrams.

4. The mechanical fastening tab according to claim 1 wherein said fastening tab has a Gurley stiffness value of less than about 200 milligrams.

5. The mechanical fastening tab according to claim 1 wherein said fastening tab has a Gurley stiffness value of less than about 75 milligrams.

6. The mechanical fastening tab according to claim 1 wherein said Gurley stiffness value is determined in the machine direction of the mechanical fastening tab.

7. The mechanical fastening tab according to claim 1 wherein said substrate overlays 100 percent of a planar surface of said first mechanical fastener component.

8. The mechanical fastening tab according to claim 1 wherein said substrate overlays from about 2 to about 98 percent of a planar surface of said first mechanical fastener component.

9. The mechanical fastening tab according to claim 1 wherein said first mechanical fastener component is formed from a polymeric material having a flexural modulus of greater than about 100 kpsi.

10. A mechanical fastening tab according to claim 1 wherein said first mechanical fastener component is formed from a polymeric material having a flexural modulus of from about 50 kpsi to about 300 kpsi.

11. The mechanical fastening tab according to claim 1 wherein said fastening tab comprises an elastomeric material.

12. A disposable product, said disposable product comprising:

an outer cover; and

a mechanical fastening tab, said mechanical fastening tab comprising:

a substrate joined to said disposable product; and

a first mechanical fastener component joined to said substrate, said first mechanical fastener component being adapted to releasably engage with said outer cover, said fastening tab having a Gurley stiffness value of less than about 1000 milligrams in an area of said fastening tab including said first mechanical fastener component.

13. The disposable product according to claim 12 wherein said first mechanical fastener component is a hook material.

14. The disposable product according to claim 12 wherein said hook material has a Gurley stiffness value of less than about 500 milligrams.

15. The disposable product according to claim 12 wherein said fastening tab has a Gurley stiffness value of less than about 200 milligrams.

16. The disposable product according to claim 12 wherein said fastening tab has a Gurley stiffness value of less than about 75 milligrams.

17. The disposable product according to claim 12 wherein when said first mechanical fastener component is releasably engaged with said outer cover and is subjected to shear forces, said outer cover deforms to dissipate a portion of said shear forces.

18. The disposable product according to claim 12 further comprising a bodyside liner and an absorbent core located between said outer cover and said bodyside liner.

19. The disposable product according to claim 12 wherein said substrate overlays 100 percent of a planar surface of said first mechanical fastener component.

20. The disposable product according to claim 12 wherein said substrate overlays from about 98 to about 2 percent of a planar surface of said first mechanical fastener component.

21. The disposable product according to claim 12 wherein said outer cover comprises a nonwoven outer surface.

22. The disposable product according to claim 21 wherein said outer cover comprises a film/nonwoven laminate.

23. The disposable product according to claim 21 wherein said outer cover has a Gurley stiffness value of less than about 100 milligrams.

24. The disposable product according to claim 21 wherein said outer cover has a Gurley stiffness value of less than about 75 milligrams.

25. The disposable product according to claim 21 wherein said outer cover has a Gurley stiffness value of less than about 50 milligrams.

26. The disposable product according to claim 12 wherein when said fastening tab and said outer cover are engaged to form a fastener composite said fastener composite having a Gurley stiffness value of less than 1000 milligrams.

27. The disposable product according to claim 12 wherein when said fastening tab and said outer cover are engaged to form a fastener composite, said fastener composite has a Gurley stiffness values of less than 500 milligrams.

28. The disposable product according to claim 12 wherein when said fastening tab and said outer cover are engaged to form a fastener composite, said fastener composite has a Gurley stiffness values of less than 200 milligrams.

29. The disposable product according to claim 12 wherein when said fastening tab and said outer cover are engaged to form a fastener composite, said fastener composite has a Gurley stiffness values of less than 75 milligrams.

30. The disposable product according to claim 12 wherein said outer cover further comprises a second mechanical fastener component.

31. The disposable product according to claim 30 wherein said second mechanical fastener component comprises a loop material.

32. The disposable product according to claim 31 wherein said loop material is selected from the group consisting of woven materials, nonwoven materials, and knit materials.

33. The disposable product according to claim 12 wherein said fastening tab comprises an elastomeric material.

34. A disposable absorbent product, said disposable absorbent product comprising:

an outer cover comprising a film material having attached thereto a nonwoven material to form a laminate, said laminate having a Gurley stiffness value of less than 100 milligrams;

a bodyside liner;

an absorbent core located between said outer cover and said bodyside liner; and

a mechanical fastening tab, said mechanical fastening tab comprising:

a substrate joined to said disposable absorbent product; and

a first mechanical fastener component joined to said substrate, said first mechanical fastener component being adapted to releasably engage with said laminate, said fastening tab having a Gurley stiffness value of less than about 1000 milligrams in an area of said fastening tab including said first mechanical fastener component.

35. The disposable absorbent product according to claim 34 wherein said first mechanical fastener component is a hook material.

36. The disposable absorbent product according to claim 34 wherein said hook material has a Gurley stiffness value of less than about 500 milligrams.

37. The disposable absorbent product according to claim 34 wherein said fastening tab has a Gurley stiffness value of less than about 200 milligrams.

38. The disposable absorbent product according to claim 34 wherein said fastening tab has a Gurley stiffness value of less than about 75 milligrams.

39. The disposable absorbent product according to claim 34 wherein said laminate has a Gurley stiffness value of less than 75 milligrams.

40. The disposable absorbent product according to claim 34 wherein said laminate has a Gurley stiffness value of less than 50 milligrams.

41. The disposable absorbent product according to claim 34 wherein when said fastening tab and said laminate are engaged to form a fastener composite, said fastener composite has a Gurley stiffness value of less than 1000 milligrams.

42. The disposable absorbent product according to claim 34 wherein when said fastening tab and said laminate are engaged to form a fastener composite, said fastener composite has a Gurley stiffness value of less than 500 milligrams.

43. The disposable absorbent product according to claim 34 wherein when said fastening tab and said laminate are engaged to form a fastener composite, said fastener composite has a Gurley stiffness value of less than 200 milligrams.

44. The disposable absorbent product according to claim 34 wherein when said fastening tab and said laminate are engaged to form a fastener composite, said fastener composite has a Gurley stiffness value of less than 75 milligrams.

45. A disposable absorbent product, said disposable absorbent product comprising:

an outer cover comprising a film material having attached thereto a nonwoven material to form a laminate, the nonwoven material forming the outer surface of said laminate, said laminate having a Gurley stiffness value of less than 100 milligrams;

a bodyside liner;

an absorbent core located between said outer cover and said bodyside liner; and

a mechanical fastening tab, said mechanical fastening tab comprising:

a substrate joined to said disposable absorbent product; and

a first mechanical fastener component joined to said substrate, said first mechanical fastener component being adapted to releasably engage with said nonwoven material of said laminate, said fastening tab having a Gurley stiffness value of less than about 1000 milligrams in an area of said fastening tab including said first mechanical fastener component

wherein, when said first mechanical fastener component is releasably engaged with said nonwoven material of said laminate and is subjected to shear forces, said laminate deforms to dissipate a portion of said shear forces.

46. The disposable absorbent product according to claim 45 wherein said first mechanical fastener component is a hook material.

47. The disposable absorbent product according to claim 45 wherein said hook material has a Gurley stiffness value of less than about 500 milligrams.

48. The disposable absorbent product according to claim 45 wherein said fastening tab has a Gurley stiffness value of less than about 200 milligrams.

49. The disposable absorbent product according to claim 45 wherein said fastening tab has a Gurley stiffness value of less than about 75 milligrams.

50. The disposable absorbent product according to claim 45 wherein said laminate has a Gurley stiffness value of less than 75 milligrams.

51. The disposable absorbent product according to claim 45 wherein said laminate has a Gurley stiffness value of less than 50 milligrams.

52. The disposable absorbent product according to claim 45 wherein said outer cover is a stretch thermal laminate.

53. The disposable absorbent product according to claim 46 wherein said outer cover is an elastomeric material.

54. A disposable product, said disposable product comprising:

an outer cover;

a second mechanical fastener component attached to said outer cover; and

a mechanical fastening tab, said mechanical fastening tab comprising:

a substrate joined to said disposable product; and

a first mechanical fastener component joined to said substrate, said first mechanical fastener component being adapted to releasably engage with said second mechanical fastener component, said fastening tab having a Gurley stiffness value of less than about 1000 milligrams in an area of said fastening tab including said first mechanical fastener component.

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X. RELATED PROCEEDINGS APPENDIX

The Appellants' legal representative, or assignee, does not know of any other appeal or interferences which will affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

However, as noted, the final decision in Appeal No. 2000000921 in U.S. Patent Application No. 08/366,090 which resulted in U.S. Patent No. 6,994,698 addressed issues quite similar to those presented in this appeal, and should therefore be of interest to the panel. A copy of Paper 25 of Appeal No. 2000000921 is included in the Evidence Appendix.